techdebate **Is a tablet a PC, or does it represent a real shift?** **PAGE 21**

NETWORKWORLD

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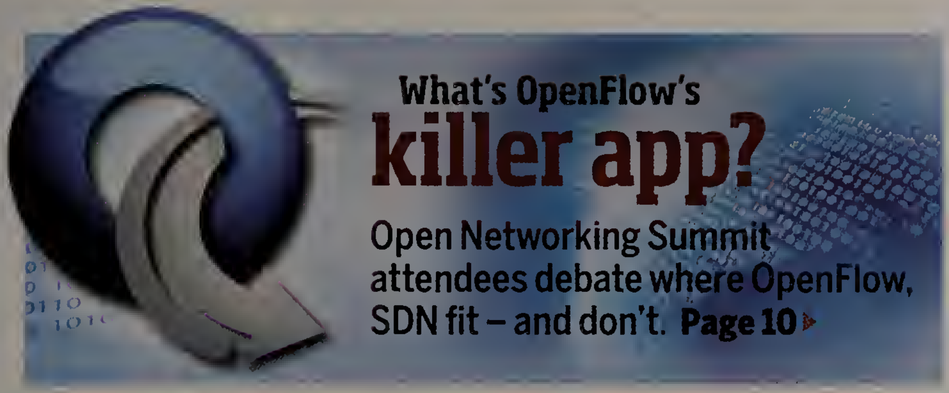
CLEAR CHOICE TEST TABLET COMPUTERS

The dawning of the business class tablet

In a **10-product test**, Fujitsu Stylistic and GammaTech Durabook are strong contenders against the iPad 2. **Page 24** ▶



What's OpenFlow's killer app?

Open Networking Summit attendees debate where OpenFlow, SDN fit – and don't. **Page 10** ▶

High-speed Ethernet: a planning guide

Everything you need to know about migrating to 40G/100G Ethernet

BY DAVID NEWMAN

TEN-GIGABIT ETHERNET was so last year.

Standards-based 40G and 100G Ethernet switches and routers are starting to show up in enterprise networks, following ratification of the IEEE 802.3ba specification in mid-2010.

It's easy to understand the motivation: Fast downlinks require even faster uplinks. The current solution, link aggregation of multiple 10G pipes, works well but only scales up to a point.

At the same time, servers for some high-performance applications now use 10G network interface cards, again requiring a

▶ *See* **Ethernet,** *page 14*

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FROM THE EDITOR | JOHN DIX

Nudging IT forward

There is basic agreement on the nirvana vision for the next-generation data center, but the tricky part is getting there from here.

That was the conclusion of speakers from Dell, Juniper and VCE (the company formed by Cisco and EMC with investments from VMware and Intel) in a panel discussion I recently hosted Syracuse, N.Y., at the CABLExpress Data Center Symposium presented by CXtec and TERACAI, resellers.

Broadly speaking, the panel agreed that, if you could build it from scratch today, the modern data center would consist of x86-based virtualized resources with converged compute/storage/networking and access to cloud services for overflow demands. All storage would be shared and it wouldn't matter if it was in the isle or across the room. The network would be flat and never require more than a single hop between devices. And everything would be centrally managed.

But the reality today, as one buyer in the audience reminded us, is we spend our time building systems for different business requirements and continuously tweak them for those siloed needs, leaving us with both technical and political constraints that make it hard to change.

Compounding the problem: the difficulty in getting a handle on real TCO figures, said panelist Drew Engstrom, marketing director of enterprise strategy at Dell. It is very complex to come up with meaningful figures for, say, an ERP system given all the software and hardware components involved. Many customers don't know what they don't know, he said. Given that, "it is hard to make smart decisions about how to make IT more efficient."

Thankfully, virtualization is delivering efficiencies organically by driving up server utilization rates, panelists and attendees agreed. While some buyers are ecstatic to see rates jump from 3% utilization to 20%, most people in attendance seemed to think 50% was a reasonable target level.

But every virtualization project eventually becomes an IT reorg effort, the panelists warned. When it is as easy to add memory to a VM as sliding a bar on a GUI, you need to carefully rethink who can do what. Some vendors, for example, now enable server administrators to muck with virtual network controls. A user in the audience who tried that approach said it made server provisioning a breeze but created service nightmares.

There are no silver bullets, the panelists agreed, but there are enough compelling new technologies for companies to make strides forward. Converging compute/storage/networking is a core strategy, said panelist Greg Dubrule, principal architect with VCE's Northeast sales team. But it isn't an all-or-nothing proposition. You can implement it in stages.

Every step forward gets us closer to nirvana.

John A. Dix

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peersay

Skepticism on E-Cat

FIRST OF ALL, we need to see if this works. I'll believe it when I see it, and I don't expect to see it, at least anytime soon (Re: "Cheap power: An overnight revolution"; tinyurl.com/3egbdd9). Second of all, it's irresponsible to refer to any change here as "overnight." How long might it take to spool up manufacturing? Distribution? For a market to be formed and for supply and demand to balance? What are the risks? Is the mysterious catalyst only sourced from a politically unstable country? Or perhaps the bottom of the Marianas Trench? What about the current oil economy? Do you think the current players will just roll over? How big a depression do you think would result if this infrastructure was obsoleted "overnight"?

Really, I'd like all of this to be real, but a little end-to-end systems thinking is appropriate here. Fanboy cheering is always fun, but I suspect, if this really works, all won't be as easy and especially not as fast as the author has assumed.

farpoint1

IT SOUNDS INTERESTING but I would love to see the equation for the nuclear transformation. The last thing one would want is a fusion reaction that produces free neutrons. Other forms of radiation (alpha, beta, gamma) are bad enough when humans are exposed but neutrons have a nasty habit of transmuting elements and creating new (and potentially hot) isotopes (Cobalt-60, anyone)?

Zzznorch

SSL certificates

BRUCE SCHNEIER TELLS us that "complexity is the enemy of security," and in the mess we call SSL Certificate Authorities we certainly have excess complexity (Re: "The SSL certificate industry can and should be replaced"; tinyurl.com/3pd8okz).

How many sites do you need tight security on? Credit Union, maybe a few others? Those are the ones you need to verify the certificates on; the rest can run under the existing system of marginal trust.

Mike_Acker

Remembering Dennis Ritchie

(RE: "DENNIS RITCHIE, Father of Unix and C programming language, dead at 70"; tinyurl.com/3ohbhep):

```
#include <stdio.h>

// the White Book (aka K&R) still is the best
// example of technical writing I have ever
seen

int main(void)
{
void * dmr = NULL;
printf( “Goodby World\n” );
return( 0 );
}

</stdio.h>
```

mr_bandit

MBAs for tech pros?

AN MBA IS a valid requirement for C level and near C level positions, but like so many things the desire for "the best" credentialed employee has corrupted the standard (Re: "Should tech pros get an MBA?" tinyurl.com/447slpm). There are far too many IT staff position openings being posted with "MBA" as required or desired. The "MBA" has lost much of its specificity as to what the credential conveys, with MBAs available in almost anything that people might receive compensation for.

Ulysses

> The desire for "the best" credentialed employee has **corrupted the standard.**

WHILE I DO not think most IT pros need an MBA, the spirit of this post is very important. IT pros really need to ensure that they develop a good understanding of how their business leaders think, and how to align IT strategy with business goals. Quite often engineers provide value to the company by trying to deploy the best technical infrastructure, and often I see the end result is a misalignment, analogous to purchasing a fleet of sports cars for a business where small sedans or hybrids may be a much better fit for the business objective.

Art Fewell

NETWORKWORLD

492 Old Connecticut Path, P.O. Box 9002
Framingham, MA, 01701-9002
Main Phone: (508) 766-5301
E-mail: firstinitial_lastname@nww.com
Editorial Calendar: http://tinyurl.com/39sf649

EDITORIAL
Editor in Chief: John Dix
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Editorial Operations Manager: Cheryl Crivello
Office Manager, Editorial: Pat Josefek

SUBSCRIPTIONS
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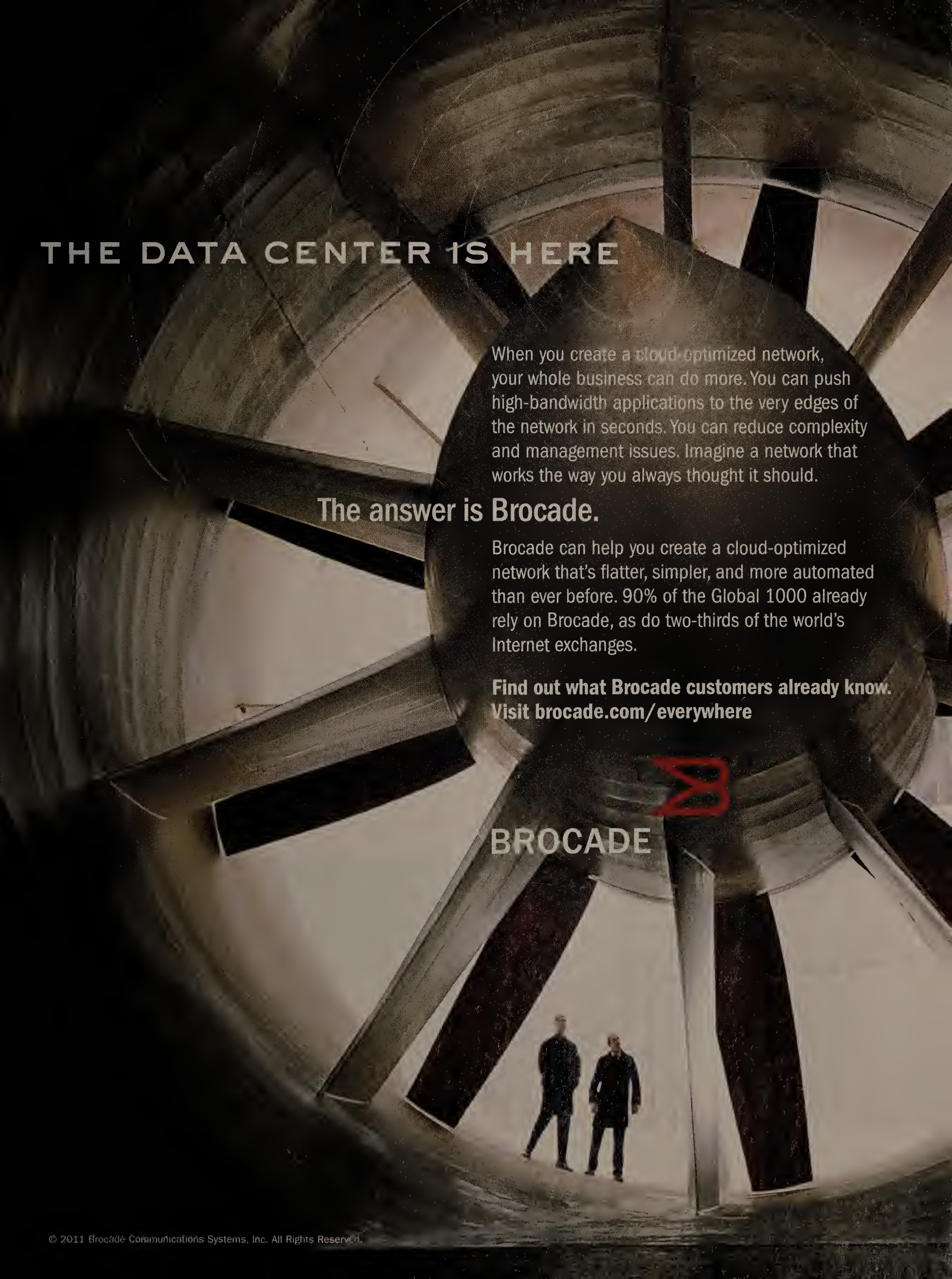

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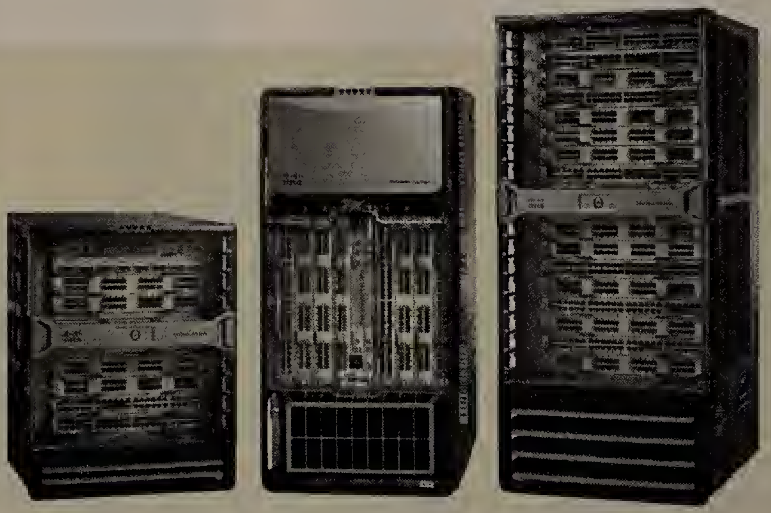

Cisco bulks up Nexus portfolio

CISCO LAST WEEK unveiled a raft of networking enhancements and extensions designed to scale data centers to securely support increasing amounts of data. As expected, Cisco rolled out the second generation of its Nexus 7000 switching platform, which scales the line to 15 terabits. Cisco also unveiled a nine-slot Nexus 7000 chassis, as well as a 16-port 40Gbps Ethernet switch in its Nexus 3000 line for high-performance trading environments. Also, Cisco rolled out a 48-port 100/1000Mbps Nexus 3000 Ethernet switch, fabric extensions to the Nexus 5500 top-of-rack switch, and a virtual firewall to help secure multi-tenant and cloud environments. The new and enhanced products allow the Nexus 7000 line to significantly scale 10G Ethernet density to support increasingly virtualized data centers that may house two and three times as many virtual machines as physical servers. Cisco says that by 2013, there will be 56 exabytes, or about 12.8 billion online movies, crossing the Internet per month. To accommodate that, Cisco says the newly enhanced Nexus 7000 and 5500 can now support 12,000 physical servers at 10G each, double that of rival Juniper's QFabric line, and Alcatel-Lucent's OmniSwitch 6850E and 6900 switches. "The scale is huge," says Zeus Kerravala, principal analyst at ZK Research. "Twelve thousand servers is a pretty good sized fabric." ***tinyurl.com/3csoyfs***

BlackBerry losing sway in enterprise

ENTERPRISE USERS, who have long been RIM's firewall against the iPhone and Android devices, are increasingly jumping ship. A new survey released by Enterprise Management Associates (EMA) found that 30% of BlackBerry users in enterprises of 10,000 employees or more plan to switch to a different platform over the next year. EMA says this will lead to a significant reduction of RIM's market share in large enterprises, which currently stands at 52%. The rate of abandonment is far more dramatic than anticipated, says Steve Brasen, EMA's managing research director. "Both enterprises and employees indicated they were broadly abandoning BlackBerry devices for primarily Android and iOS platforms, and this data was collected before the recent BlackBerry service failures, which can be expected to even further accelerate migration." ***tinyurl.com/4xydzhq***

IT VIDEO

Apologizes for outage

Disappointed BlackBerry users heard from Research in Motion founder and co-CEO Mike Lazaridis at the start of BlackBerry's developer conference in San Francisco last week. Lazaridis offered a quick, apologetic reference for the service outage. ***tinyurl.com/3wy7z99***

Flash flaw allows webcam spying

ADOBE IS working on a fix for a Flash Player vulnerability that can be exploited via clickjacking techniques to turn on people's webcams or microphones without their knowledge. The issue was discovered by a Stanford University computer science student named Feross Aboukhadijeh, who based his proof-of-concept exploit on a similar one disclosed in 2008 by an anonymous researcher. The 2008 webcam spying attack involved loading the Adobe Flash Player Settings Manager in an invisible iframe and tricking users into enabling webcam and microphone access through it. Adobe responded at the time by inserting code into the Flash Player Settings Manager page that prevents it from being iframed. However, Aboukhadijeh found a way to bypass Adobe's frame-busting code. "I was really surprised to find out that this actually works," Aboukhadijeh said. ***tinyurl.com/3c9nnzn***

Google Apps failing LAPD, says advocacy group

A CONSUMER advocacy group released documents that indicate CSC, the prime contractor for Google Apps services for Los Angeles, has allegedly not managed to meet the security requirements of the Los Angeles Police Department and other safety-related departments. The group, Consumer Watchdog,

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GOOD **BAD** **UGLY**

Touchscreens get more touchy-feely

good

NOW THAT you've got the basics down of using smartphone and tablet touchscreens, Carnegie Mellon University researchers are ready to take you to the next level. They showed off technology last week called TapSense that takes more advantage of your fingers to better control computing devices such as iPhones and Android tablets. For example, using your fingernails can signal one thing to a device, whereas pressing the touchscreen with the pad of your fingertip or even a knuckle can send a different instruction. "TapSense basically doubles the input bandwidth for a touchscreen," said Chris Harrison, a Ph.D. student in Carnegie Mellon's Human-Computer Interaction Institute, which has produced a proof-of-concept system.

Son of Stuxnet?

bad

SYMANTEC IS warning of a new malware threat called W32.Duqu that looks to have been written by the authors of Stuxnet or someone with access to Stuxnet source code. Stuxnet was considered by some to be the most sophisticated malware ever and was designed to wreck industrial control systems. Duqu's goal is said to be stealing data from makers of industrial control systems in order to attack companies that use the systems.

Microsoft ASP.Net sites under attack

ugly

HACKERS ARE in the midst of a massively successful SQL injection attack targeting websites built on Microsoft's ASP.Net platform. About 180,000 pages have been affected so far, security researchers say. Attackers have planted malicious JavaScript on ASP.Net sites that causes the browser to load an iframe with one of two remote sites: www3.strongdefenseiz.in and www2.safetosecurity.rr.nu, according to security researchers at Armorize who discovered the attack. From there, the iframe attempts to plant malware on the visitor's PC via a number of browser drive-by exploits. Microsoft has been offering ASP.Net programmers information on how to protect against SQL injection attacks since at least 2005.

PARITY BITS

425,000

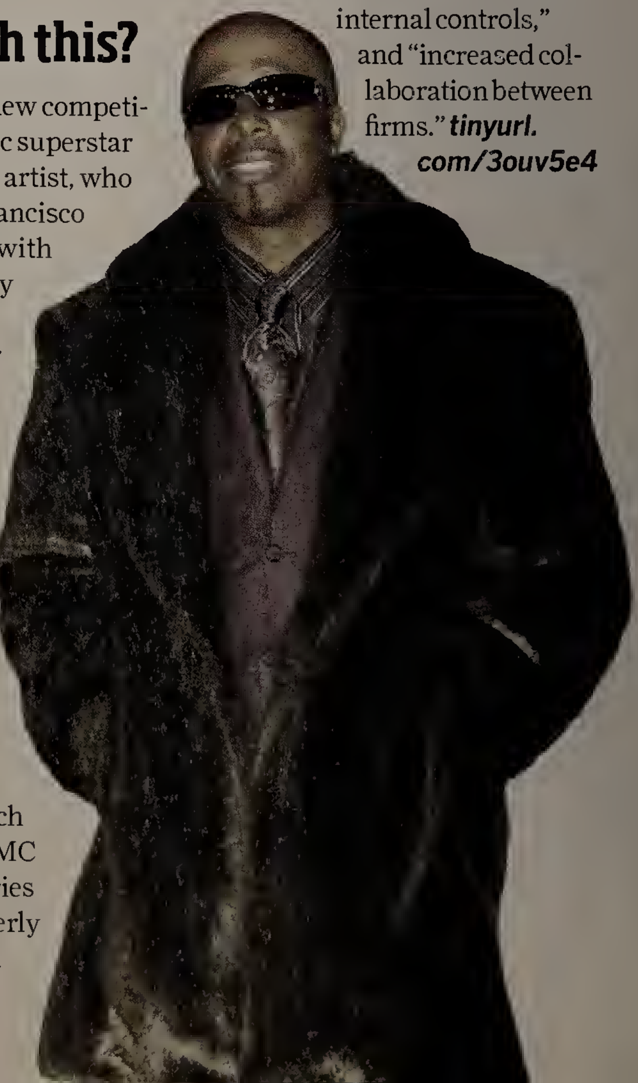
Number of pay phones left in the U.S. (down from 2.2 million in 2000).

SOURCE: AMERICAN PUBLIC COMMUNICATIONS COUNCIL

released what appears to be a letter from Randi Levin, general manager of the information technology agency for the City of Los Angeles, written on Aug. 17 to Michael Schneider, senior manager of contracts and subcontracts at CSC, that details "broken promises and missed deadlines." The Google Apps contract with Los Angeles is a closely watched project based on a $7.25 million contract to CSC in 2009 that was bitterly fought with Microsoft. For its part, Google issued a statement saying, "This is just the latest in a long list of press stunts from a group that admits to working closely with our competitors. We are meeting our commitments to the City of Los Angeles." ***tinyurl.com/3q49jzw***

Can't touch this?

GOOGLE HAS a new competitor: '80s pop music superstar MC Hammer. The artist, who lives in the San Francisco area, got together with some tech industry friends and after brainstorming for innovative projects decided to develop a search engine, he said at last week's Web 2.0 Summit. The project, called WireDoo, is in a very early stage and focuses on providing information that is related to a search query. In a demo, MC Hammer ran queries for the 90210 Beverly Hills zip code, and the engine displayed options to explore related information like schools, homes and crime rates, and to drill down further in each. ***tinyurl.com/4xxhclp***



MC HAMMER PHOTO: REUTERS/FRED PROUSER

Execs feeling vulnerable

SECURITY FIRM Kroll's annual fraud report finds that half of all senior executives feel their companies are vulnerable to information theft, up sharply from 38% last year. Among 1,200 senior executives polled, 32% blamed "complexity of IT infrastructure" as one of the main reasons for exposure to fraud. Other reasons mentioned by about a quarter of respondents included "high staff turnover," "entry to new, riskier markets," "weaker internal controls," and "increased collaboration between firms." ***tinyurl.com/3ouv5e4***

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What's OpenFlow's killer app?

BY JIM DUFFY

PALO ALTO, Calif. — While most participants at the inaugural Open Networking Summit extolled the virtues of software-defined networking (SDN) and the OpenFlow protocol, others are waiting for key features to emerge before considering it for their networks.

OpenFlow and SDN allow a network to be programmed as if it were a computer, proponents of the technology say. It provides a layer of abstraction between the physical network to the control element, allowing the network to be configured or manipulated through software, which then opens it to further innovation.

But missing from OpenFlow, some presenters said, is support for IPv6, MAC-in-MAC Provider Backbone Bridging, Q-in-Q VLAN stacking, QoS and traffic shaping capabilities, fault tolerance and scalability. Some said these gaps limit the OpenFlow protocol's, and SDN's, applicability to their networks.

"We're very much looking forward to IPv6," said Stephen Stuart, distinguished engineer at Google. "Current SDN implementations don't speak the standard protocols" such as IPv6, MPLS, IS-IS with TE, RSVP-TE and BGP. "More people would try out OpenFlow and SDN if they spoke standard protocols."

IPv6 will be one of a number of features coming in Version 1.2 of OpenFlow in December, said Dan Pitt, vice chairman of the summit and executive director of the Open Networking Foundation, an organization driving standardization and adoption of OpenFlow and SDN, and a co-sponsor of the summit.

Others said OpenFlow and SDN are more useful to huge data center-driven companies like Google and network operators than they are to the enterprise.

"I completely embrace the disruptive potential but I'm still puzzled on how it will impact the enterprise," said Peter Christy, co-founder of consultancy Internet Research Group. "The enterprise is the biggest part of the networking market. Building a reliable SDN controller is a challenging task. Customers don't value reproducing the same thing with a new technology. There have been few OF/SDN 'killer' apps so far. SDN is not ready for the enterprise market yet."

Christy spoke during a panel session on opportunities and challenges with OpenFlow and SDN in the market. Others on that panel took issue with his assessment.

SDN will increase network agility and virtualization in the enterprise, and serve as a common control plane for both wired and wireless LAN infrastructures, said Geng Lin, CTO of the networking business at Dell. "We need the hypervisor and the physical network to work together, collaborate, influence each other" through SDN, Lin said.

Early adopter: Stanford University's Gates Computer Science Building network is running on OpenFlow.

Amin Vahdat, a principal engineer at Google, said, "I think the killer app is out there: Stanford is running the Gates building on OpenFlow." Vahdat was referring to Stanford University's use of the protocol it helped create in its computer science department. "It's doing lots of things that are really, really hard right now."

These issues are not stopping research and academia from putting OpenFlow and SDN through the gauntlet. Stanford, Indiana University and Internet2 are engaged in the Network Development and Deployment Initiative (NDDI), touted as the first production deployment of OpenFlow technology for an SDN that will allow researchers to experiment with Internet protocols and architectures, while at the same time enabling scientists to conduct research with collaborators worldwide.

NDDI will support projects ranging from the global exchange of massive datasets from the Large Hadron Collider, radio astronomy and climate modeling experiments, to large-scale network research initiatives such as the National Science Foundation's GENI project and Princeton University's PlanetLab, the NDDI website says.

"If we create the capacity for innovation, get it widely dispersed and let people play, SDN will turn into something wild," said Rob Vietzke, executive director of network services for Internet2.

"Sometimes you have to challenge the status quo," added Matt Davy, Indiana University's chief network architect.

That's what Verizon plans to do with SDN, though not for something wild — something practical. The carrier sees SDN as a way to reduce cost in its infrastructure.

"Why does Verizon care? It's economics," said Stuart Elby, chief technologist of Verizon Digital Media Services. "The reason is for cost. There's a tremendous reason to do this quickly based on cost savings."

Vertically integrated products are not following the trend of revenue, Elby said. SDN will help balance that out by integrating those products horizontally through virtualization and a common control plane for programmability.

OpenFlow could help Verizon optimize its network for video delivery by enabling traffic steering for long-lived flows and cut-through switching to reduce cost, and for hybrid cloud computing services to enable bandwidth-on-demand for data center interconnection.

But like other speakers, Elby said OpenFlow itself will need to be optimized for the task. "OpenFlow requires several enhancements to work effectively in virtualized cloud environments with lots of legacy infrastructure," he said. ■

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Schools find ways around crowded Wi-Fi nets

Congestion, interference bogging down 2.4GHz nets

BY JOHN COX

OF THE 470,000 Wi-Fi connections made on a recent day at Abilene Christian University, fully 94% used the 2.4GHz band, representing an extreme example of how today's surging number of Wi-Fi clients is crowding the band least able to accommodate them.

At ACU, this is not considered a problem, at least not yet. In part, that's because of careful wireless LAN design and capacity planning. And partly because a goodly percentage of mobile devices that can run on the alternative 5GHz band, do so: On that same day, 47% of the school's laptops and desktops, and two-thirds of its iPads, cruised on 5GHz, via either 802.11a or 802.11n.

Yet relatively few of today's Wi-Fi clients support 5GHz.

"The challenge isn't that 5GHz-capable devices are not connecting on the 5GHz band, but rather the challenge is there are too few devices that have 5GHz capabilities," says Arthur Brant, ACU's director of networking service. "The 2.4GHz band is congested, a symptom of the number of devices that only operate on that band, and the limitation of its [only] three non-overlapping channels."

A growing concern

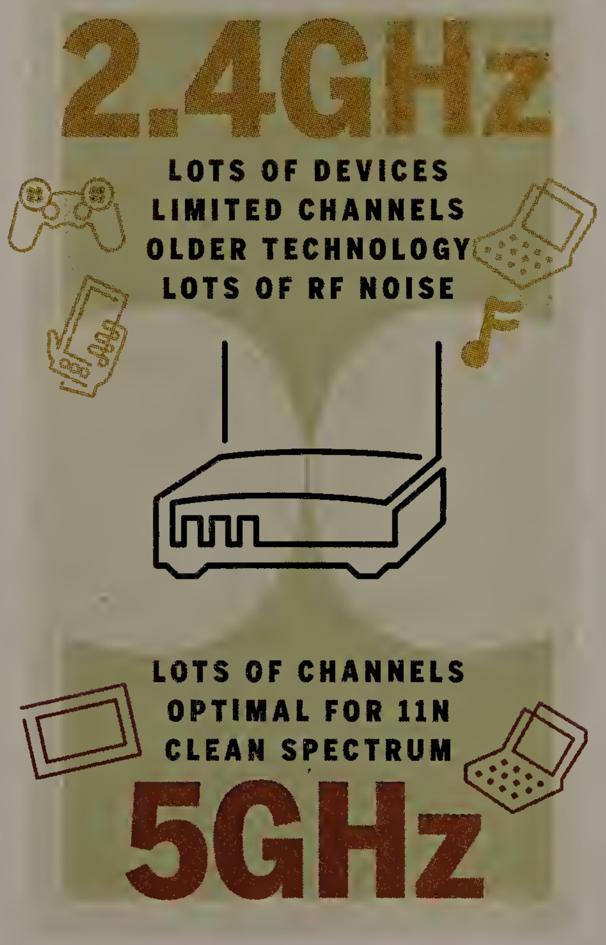
This congestion is a growing concern and, in some cases, a problem on college campuses. More schools are rebuilding campuswide Wi-Fi networks that now are designed for 5GHz. That means more costs, including half as many access points and associated cabling and ports, because the higher frequency doesn't penetrate walls as well. But it also means four to six times the number of non-overlapping channels, much greater capacity and a clean radio frequency.

At a range of schools, IT staff say 50% to 60% or more of their current Wi-Fi device population, including the tidal wave of smartphones and other mobile devices, are stuck with the 2.4GHz band. Somewhat surprisingly, that's true for many laptop PCs, such as Dell's value-line of Inspiron laptops and its higher-performing XPS line, though the latter do offer a $35 upgrade to a dual-band Wi-Fi radio.

"Since most users don't understand the difference, they don't change this option," says John Turner, director for network and systems at Brandeis University in Waltham, Mass. The Brandeis Wi-Fi network, based on Aruba's dual-band access points, benefits from the growing popularity of Apple Macs. About 50% of the students have them "and will connect on the 5GHz band nicely," Turner says.

Wi-Fi crowding, congestion

IT groups are turning to 5GHz to relieve Wi-Fi congestion, improve connectivity, and maximize throughput.



"Our jobs would be easier if clients just all did a good job using the 5GHz band and left the 2.4 for other devices, like the [Nintendo] Wii and lower-power devices like smartphones," he says.

But they don't. That's partly because of decisions by radio and device manufacturers and partly due to the 802.11 standard, which from the outset has control of wireless access in the client radio, not the access point. More Wi-Fi brains and control is shifting slowly to the network, as vendors implement optional parts of the IEEE 802.11 standards, and the .11 working group develops new standards.

At University of Massachusetts-Amherst, the WLAN for campus residence halls has been redesigned for 5GHz (though service on 2.4 is still offered). So far this year, the campus Aruba network has identified 47,000 unique Wi-Fi devices, with just over one-third making use of 5GHz.

The resulting interference levels are high in the residence halls in the 2.4 band, and during peak periods in the evening users on this band see throughput ranging from 5Mbps to 10Mbps. But clients on the 5GHz band "regularly showed performance in excess of 20Mbps" all day, according to Rick Tuthill and Michael Dickson, network engineers with the school's Office of Information Technologies.

The 2.4GHz junk band

"We would certainly like to see more clients choose 5GHz when available, because we believe we can deliver a better experience there," says Dan McCarriar, assistant director of network services at Carnegie Mellon University in Pittsburgh. "The general perception in IT, and it matches our experience, is that 2.4GHz has become somewhat of a junk band, with all the consumer Wi-Fi routers and 'hotspot' devices that prefer it." In off-campus sites leased by CMU, "it's not uncommon to see dozens of competing SSIDs and ad hoc devices operating in 2.4GHz frequencies, causing co-channel and adjacent channel interference and any number of other headaches."

Even where congestion isn't a problem the collection of "junk" on the 2.4GHz band can bog down performance. "The older equipment slows down the network for everyone, not just the older clients," Brandeis' Turner says.

Gaming systems add another, related set of problems. "These clients, like Xbox, Wii and TiVo, have very old network cards and don't play well at all with high-speed networks," Turner says. "In fact, Wii consoles require your network to support a very slow data rate — 2Mbps — or they won't even connect! In our enterprise network, those clients hang on to the 2.4 signal for dear life, despite our having access points nearly every 75 feet."

Users with high-throughput 802.11n radios in spiffy new laptops often can't get the most out of that higher throughput, says Marcelo Lew, wireless enterprise administrator at the University of Denver. "You have a Ferrari, but if you are sharing a single-lane road [2.4GHz band] with a lot of other Ferraris, you won't

▶ *See* **Wi-Fi,** *page 32*

RISKANDREWARD

BY ANDREAS ANTONOPOULOS

The world of security has turned on its head

I AM leaving the world of independent analysts to pursue new adventures. In my last column, I'd like to explore some of my recurring themes and offer some predictions.

The world of security was always a fast-moving space, but in the last three years it has become a roller coaster. Part of that is because of huge changes in IT itself. Part of it is because of the importance of electronic communications in our lives. Some of the trends will continue to make security challenging, yet also rewarding and fascinating.

Mobility: The whole paradigm of security was based on immovable systems in concentric perimeters. That model is well past broken, yet it persists throughout most environments. Have a look at how many security systems rely on IP addresses and you will see why mobility breaks everything. Things will get more exciting as IT, security and society as a whole come to grips with the idea of enormously powerful sensor and communications platforms, full of every personal detail and experience, permanently carried by almost every person.

Virtualization: In April 2004 I saw an enormous potential for virtualized security. I saw the possibility of joining endpoint security and network security into a new paradigm that had elements of both but was more powerful than either. Unfortunately, that space is still immature as companies have tried to patch together a strategy to secure virtual systems largely by VLAN segmentation and firewalls. This has weakened security and hampered virtualization too. I expect we will get there. The most important question is not, "How do I secure virtual systems?" but, "How do I virtualize security systems?" Answer the second and the first becomes much easier.

Cloud computing: The cloud is about to achieve a small percentage of the level of hype surrounding it, but that still means a remarkable transformation of IT and IT operations. It also means a huge opportunity for security, as well as a huge problem with security. For providers, security is not the barrier to adoption — it is the Holy Grail of profitability in the cloud. You can actually make money off security services, unlike the CPUs which are commoditized to unprofitability. Like a restaurant that loses money on food and makes all the profit on wine and cocktails, service providers need to see security for what it is: as profitable as a liquor license. Security as a service is still in its infancy but growing rapidly. Like virtualization, the question to ask is not, "How do I secure the cloud?" but, "How do I cloud-port my security?" Answering the second makes the first question a lot easier.

Those three themes have made up the bulk of my security writing for several years. It's not because they represent new security technologies or products or vendors. It's because they challenge the foundational models and notions of security that permeate most security implementations. They subvert our security by contradicting the most fundamental assumptions we make in security. In my native culture, there is a word to describe this: skiamorphe, which means a "shadow of the old form." It describes a tendency to incorporate the features of an obsolete technology in a new one when it first emerges. In security, we have not yet emerged from the shadows of a location-centric, perimeter-oriented and static model. Until we do, we will be wandering in the dark. ■

Antonopoulos is a senior vice president and founding partner at Nemertes Research, an independent technology research firm. He can be reached at andreas@nemertes.com.

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▶ **Ethernet,** *from page 1*

faster uplink at the switch. It won't be long before 10G interfaces are a standard part of server motherboards, just as Gigabit Ethernet comes standard today.

For network managers, migrating to "higher-speed Ethernet," as it's been dubbed by the Ethernet Alliance, will require changes. Most of these are at the physical layer (new cabling is required, for starters). Also, some monitoring and management gear may not be able to keep up with HSE rates.

On the plus side, HSE will help reduce prices for 10G Ethernet devices. "The real leverage [with HSE] is with pushing down the price point of 10G Ethernet, rather than the first-order effects of 100G deployment," says a senior architect at one of the largest ISPs in the U.S., who requested anonymity. "If bigger pipes are good, then bigger pipes that are affordable and create greater commoditization of 10G Ethernet are better."

Also, HSE is far more evolutionary than revolutionary. Network professionals who've worked with Ethernet will feel right at home with the 40G and 100G versions. Still, an understanding of what's new is essential.

Migration to 40G and 100G Ethernet requires no modification to upper-layer network design, networking protocols or applications. "It all looks the same to the upper layers," says Brandon Ross, eastern U.S. director of network engineering at Torrey Point Group, a network design consultancy. "There aren't any changes needed."

That means, for example, that a network using the Rapid Spanning Tree Protocol (RSTP) between switches and Open Shortest Path First (OSPF) between routers can continue to run these protocols across HSE interfaces, without configuration changes.

Applications, databases and server farms similarly won't be affected by the addition of HSE interfaces to enterprise networks. Lower latency and improved response time should be the only noticeable effects, although Ross cautions that adoption of faster networking technologies inevitably exposes bottlenecks that weren't previously visible. If, for instance, network latency previously masked a disk I/O bottleneck and HSE is now faster than the bottleneck, application performance won't improve as much as expected.

That raises a critical question when it comes to HSE adoption: Even if the protocols are ready, is the network infrastructure ready for higher speeds?

As with previous speed bumps, capturing and monitoring traffic at higher rates will impose higher horsepower requirements on network management and security systems. The old adage "you can't manage what you can't see" still holds true. In other words, the requirement to see all traffic doesn't go away just because the network got faster.

A migration to HSE may require upgrades to network management systems and security devices such as firewalls and intrusion detection/prevention systems. Network managers are well advised to check with vendors as to the maximum frame rates their devices can support with zero frame loss.

Faster versions of Ethernet pose special challenges for security devices that use Secure Sockets Layer (SSL). Dedicated hardware already is needed to encrypt and decrypt SSL traffic at 1G and 10G rates. Even with the hardware assist, next-generation firewall testing done by *Network World* suggests that security devices move traffic far more slowly when handling SSL traffic.

Performance penalties for SSL traffic at HSE rates are, if anything, likely to be even steeper. Network managers may want to consider deploying dedicated SSL decryption/encryption systems alongside existing security devices to mitigate SSL performance bottlenecks.

Another key observation point is the "span," or monitor port capability, in many Ethernet

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switches. This feature allows traffic entering or leaving a switch port (or both) to be copied to another port, where it can be redirected to an external analyzer. Some switches support multiple monitoring instances. In an HSE context, the key question is whether the switch can copy monitored traffic at 40G or 100G Ethernet line rates with no frame loss.

Even if the switch can support such a capability, there is then the question of whether the analyzer will be able to capture frames in real time. Software-based protocol analyzers are woefully underpowered for this task.

What's needed here is a hardware-based analyzer capable of lossless traffic capture at 40G or 100G rates. The analyzer also will need much larger storage capacity. At 100G rates, an analyzer capturing 1518-byte frames at line rate will need to store 750GB of data per minute. At 40G rates, the storage requirement is "only" 296GB per minute, but keep in mind both numbers are only for a single port. Hardware-based monitoring tools often are used to capture multiple simultaneous feeds, each with very significant storage requirements.

A final item in the monitoring checklist is network taps — line splitters capable of HSE rates. Not all network devices have embedded monitoring capabilities, and there are situations in which monitoring can't be enabled for administrative or technical reasons.

In these cases, an external network tap is needed. These are available in copper and fiber versions with anywhere from two to dozens of ports. The key question with these devices, as with all gear monitoring HSE traffic, is whether they can keep up with 40G and 100G rates without dropping frames.

One standard, many flavors

At the link layer, the most striking feature of HSE is that it's exactly like previous versions of Ethernet in so many ways. Ethernet's well-known framing format is untouched. The interframe gap — the amount of space between frames — hasn't changed. Neither have the minimum and maximum basic frame lengths of 64 and 1518 bytes respectively. (The IEEE did extend the maximum "envelope" size to 2000 bytes a few years ago to accommodate tunneling and VLAN stacking mechanisms, but that's unrelated to HSE.) In terms of frame contents, nothing has changed from previous versions.

Also like earlier versions, there are multiple physical-layer definitions of HSE to accommodate various distance and medium requirements. These different flavors range from a version intended only for internal device backplanes, to copper- and fiber-based versions for use in the data center, to a long-haul version of 100G Ethernet intended for spans of at least 40 kilometers (see table, page 16).

For enterprise data centers and many campus networks, the short-reach versions with maximum spans of up to 125 meters will be the most interesting and cost-effective. For greater distances long-haul versions with maximum spans of 10 km or 40 km may be more appropriate.

While HSE won't require changes in upper-layer protocols, it is different at the physical layer. Both 40G and 100G technologies will require not only new transceiver types on switches and routers, but also new cabling and new connectors and interfaces. Rolling out HSE isn't simply a matter of buying faster blades for switches and routers; network architects will need to upgrade cabling plants and test distance limits as well.

The concept of lanes drives many of the new requirements. In current 1G and 10G Ethernet products, traffic uses a single path in each direction. That works well at 10G rates, but modulating signals in high-speed optics proved difficult at higher speeds. Engineers instead adopted a parallel-optics approach in

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current versions of HSE products that splits traffic across channels called lanes, each running at 10G, and using a dedicated fiber.

Thus, 40G Ethernet is today a four-lane technology, while current 100G Ethernet interfaces use 10 lanes in each direction.

Evolution toward single-lane HSE interfaces is likely to occur over time. The IEEE 802.3ba specification describes electrical interfaces that could be implemented with a single lane in each direction, but products that implement these aren't yet shipping. For the time being, both 40G and 100G are multi-lane technologies — and that, in turn, introduces new cabling requirements.

Variations on Higher-Speed Ethernet

Physical medium	Maximum distance	40G Ethernet variant	100G Ethernet variant
Device backplane	At least 1 meter	40GBASE-KR4	NA
Copper cable	Up to 7 meters	40GBASE-CR4	100GBASE-CR10
OM3 multimode fiber cable	At least 100 meters	40GBASE-SR4	100GBASE-SR10
OM4 multimode fiber	At least 125 meters		
Single-mode fiber	At least 10 kilometers	40GBASE-LR4	100GBASE-LR4
Single-mode fiber	At least 40 kilometers	NA	100GBASE-ER4

Bulking up with fiber

Unlike 10G Ethernet, where fiber-optic cables use only two fiber Xstrands, optical cabling for 40G Ethernet currently uses 12 fibers: Two groups of four fibers send traffic in each direction, and four fibers between the two groups are left dark.

Multi-lane 100G Ethernet requires even denser optical cabling. Here, cables use 24 fibers: two arrays of 10 fibers for traffic in each direction, with two fibers on each side of each array left dark.

Both 40G and 100G flavors of HSE require "laser-optimized" fiber cables. For multimode fiber, this means using OM3-type cables for distances of up to 100 meters. For longer spans, OM4-type cables support runs of up to 125 meters.

OM3 and OM4 cables (which usually have aqua-colored jackets, to distinguish them from older OM1 and OM2 cables with orange jackets) are already recommended for 10G Ethernet, but that doesn't mean OM3 and OM4 cables can be used interchangeably between 10G and 40G interfaces.

HSE will require new cabling, but Ross notes that a migration could end up reducing the numbers of interfaces and cables needed. "People today use multiple, aggregated 10G connections" for network uplinks, Ross says. "When they move to 100G Ethernet, they actually reduce fiber demand."

There are two significant differences when it comes to HSE optical cabling: fiber count and transceiver types. As noted, fiber-optic cabling for multi-lane HSE uses either 12 or 24 fibers, compared with two fibers with 10G Ethernet. Thus, network planners will need to specify whether 10G, 40G or 100G versions of OM3 or OM4 cabling are needed.

The transceiver most commonly used for 40G Ethernet is called quad small form-factor pluggable plus (QSFP+). This connector, available for both fiber and copper cabling, resembles a slightly larger version of the SFP+ connectors used in 10G Ethernet, with the "quad" designation referring to its four pairs of transmit and receive lanes. Although QSFP+ transceivers only support 40G Ethernet today, they may support 100G Ethernet in the future when lane rates increase.

For now, 100G interfaces use C form-factor pluggable (CFP) transceivers. These are slightly larger than a smartphone and support single-mode optical cabling with 24 fibers. CFP transceivers also can support multimode fiber and copper cabling, though QSFP+ is more common. A smaller variation of CFP, called CXP, will support all the various HSE versions but are not widely available.

Requirements for copper cabling are somewhat simpler than those for fiber. Like fiber, HSE copper cabling uses multiple transmit and receive channels, each carrying one lane running at 10G rates.

Copper interfaces are defined for both 40G and 100G versions of HSE, but only for short-reach applications such as connections within a rack or between adjacent racks in a data center. Using the currently defined interfaces, HSE connections over copper can be at most 7 meters apart.

QSFP+ transceivers are used for 40G Ethernet over copper. Some large enterprise data centers already use 10G/40G top-of-rack switches. These typically support 48 SFP+ ports for 10G connections to servers, and four QSFP+ ports for 40G Ethernet uplinks for switch-to-switch connections.

Conversion between 10G and 40G rates is an especially useful feature of QSFP+ ports, both for copper and fiber. In many top-of-rack switches, a QSFP+ port also can function as four 10G Ethernet ports. This involves the use of copper or fiber "breakout" cable with a QSFP+ connector on one end and four SFP+ connectors on the other. Both sides see the connection as four 10G Ethernet interfaces.

This convertible feature offers a migration path for data centers planning, but not yet ready, to deploy 40G Ethernet. It's also cost-effective to buy and manage just one type of switch and then deploy either 10G or 40G Ethernet ports as needed.

Direct attach copper (DAC) cables already are a common means of connecting servers and switches over short distances at 10G rates, and that's likely to continue with 40G DACs. The 40G units, which comprise two QSFP+ transceivers connected by a run of twinaxial cable, are typically 3 meters or less in length.

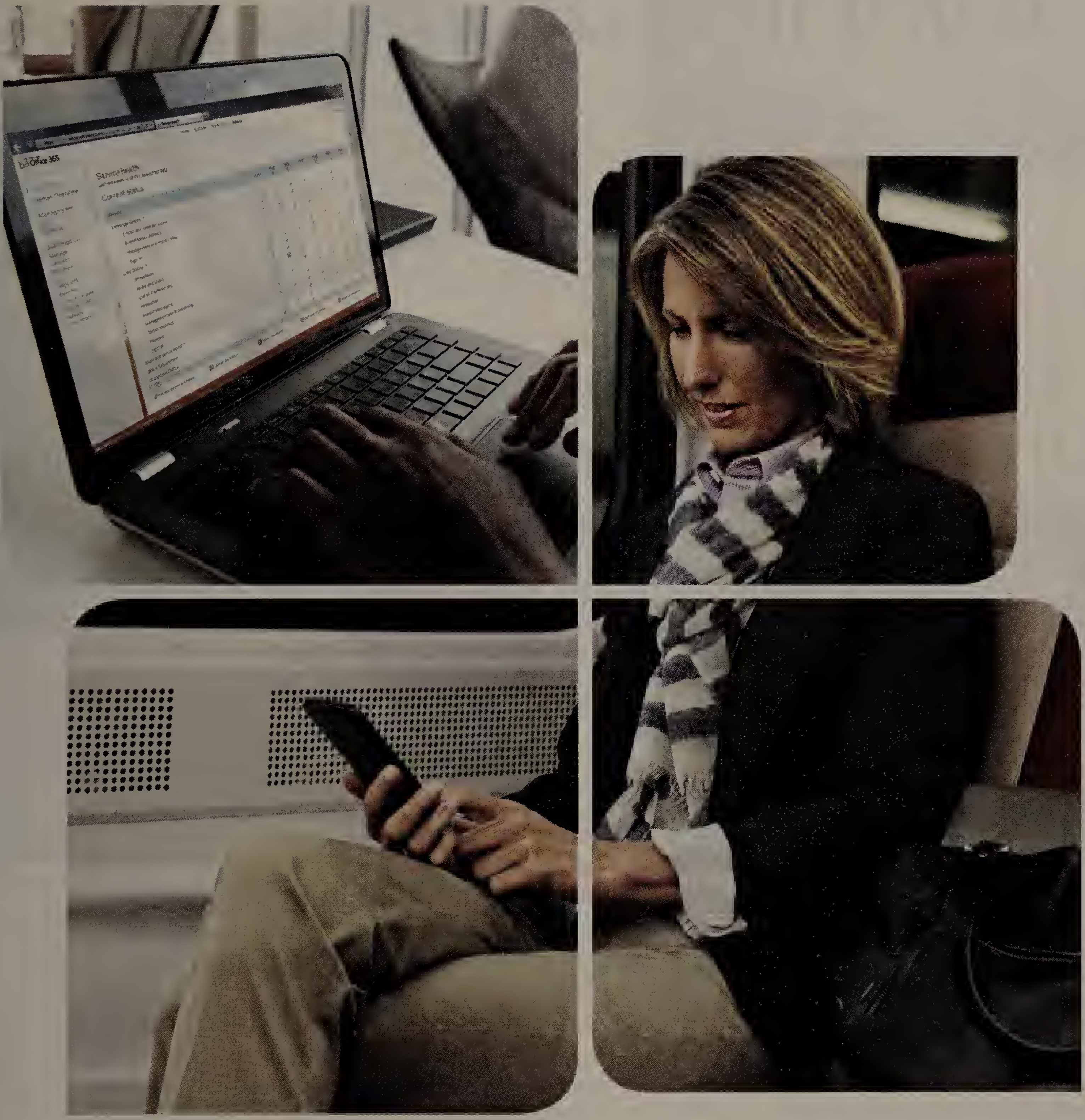
If longer spans are needed (for example, to connect racks more than 7 meters away from a core switch), network managers will need one of the fiber-based options.

In addition to QSFP+ connectors for copper or fiber, there's another fiber-only connector type known as multi-fiber push-on (MPO). These connectors support the parallel-optics approach and require MPO connectors on fiber cabling and MPO interfaces on switches and routers. The LC and SC fiber-optic connector types used in earlier versions of Ethernet aren't suitable for HSE because they terminate only two fibers.

Migrating to HSE will certainly require changes. The good news is that the changes are evolutionary in nature, and can be rolled out incrementally. Ethernet has undergone many changes over the years, but the traffic on HSE networks retains the same basic characteristics as previous generations. In the end, it really is "just Ethernet." ■

Newman is a member of the Network World Lab Alliance and president of Network Test, an independent test lab and engineering services consultancy. He can be reached at dnewman@networktest.com.

Microsoft



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PARITY BITS

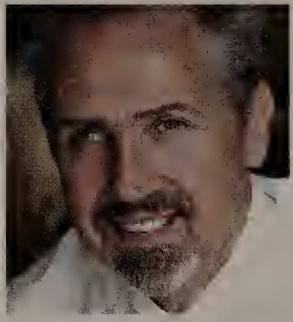
80%

Percentage of data center traffic that will be server-to-server by 2014.

SOURCE: GARTNER GROUP

TOOLS

SuperTweet: Twitter without the OAuth hassle



Mark Gibbs' Gearhead

In 2008 (just as the U.S. economy began circling the drain) here in Gearhead I wrote about updating Twitter with cURL, a free, open source, command line utility that allows you to transfer data with URL syntax using, and I quote, "DICT, FILE, FTP, FTPS, GOPHER, HTTP, HTTPS, IMAP, IMAPS, LDAP, LDAPS, POP3, POP3S, RTMP, RTSP, SCP, SFTP, SMTP, SMTPS, TELNET and TFTP [along with] SSL certificates, HTTP POST, HTTP PUT, FTP uploading, HTTP form based upload, proxies, cookies, [user name and password] authentication (Basic, Digest, NTLM, Negotiate, Kerberos ...), file transfer resume, proxy tunneling and a busload of other useful tricks."

In short, cURL is a Swiss Army knife on steroids for data transfers over TCP/IP and is available for just about any OS you can think of, which includes the usual suspects — OS X, Windows, Linux — as well as many others including Amiga, Syllable, VMS and z/OS.

So, way back in those heady days when we were all slowly but certainly losing our shirts, you could post a tweet using a command in the form of:

```
curl -u username:password -d status=“I had a chicken sandwich for lunch” http://twitter.com/statuses/update.xml
```

This method, using basic authentication, worked great and it was easy to arrange, for example, for your machines to use Twitter as a messaging system to let you know when they had problems or completed something. But on Aug. 30, 2010, Twitter stopped allowing access via basic authentication and switched to another method called OAuth or "Open Authentication."

In short, cURL is a **Swiss Army knife on steroids** for data transfers over TCP/IP

Wikipedia explains that "OAuth allows users to hand out tokens instead of credentials to their data hosted by a given service provider. Each token grants access to a specific site . . . for specific resources . . . and for a defined duration. . . . This allows a user to grant a third party site access to their information stored with another service provider, without sharing their access permissions or the full extent of their data."

The concept of separating and limiting access to a service for specific applications by separating that from the user's login is a powerful one. For example, it makes revocation of access for a single application very simple so in the case of Twitter, with so many third-party applications providing alternative ways to access the service, switching to OAuth made a lot of sense.

The only problem with Twitter's switch was that all of the simple ways to update Twitter such as using cURL stopped working once Aug. 30 rolled around. Worse still, getting the likes of cURL to use OAuth turns out to be a real bear. Luckily, there is a service called SuperTweet, which acts as a proxy for applications so they can still access Twitter via basic authentication.

To use SuperTweet you simply sign into Twitter using SuperTweet and authorize the service to have access (the only thing SuperTweet won't be able to do is access your Twitter password). You then provide SuperTweet with some simple details about your application including an email address and the application name and you're good to go . . . or rather, good to tweet.

Now SuperTweet can transparently handle OAuth for you and, using the SuperTweet interface instead of Twitter's, you can do most of the things you used to be able to do. Thus, using cURL:

```
curl -u username:password -d status=“I had a chicken sandwich for lunch” http://api.supertweet.net/1/statuses/update.xml
```

If you are going to be performing a large volume of Twitter transactions you should download the SuperTweet proxy (which is written in Java) and run it on your own server.

SuperTweet is a brilliant idea that works great and solves an otherwise irritating problem brilliantly! I award SuperTweet a Gearhead rating of 5 out of 5! ■

@quistuipater tweets in Ventura, Calif. Twitter away to gearhead@gibbs.com.

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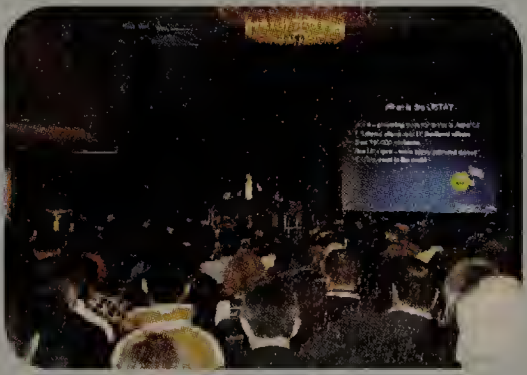

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GADGETS

4G device options beyond the smartphone or USB modem

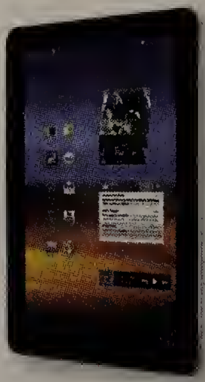
Keith Shaw's Cool Tools

VERIZON'S 4G LTE network has been available in several major cities for awhile now, and it continues to expand to more regions across the U.S. We've done some early network testing, but now have tried two devices (a tablet and netbook) that integrate the 4G LTE network connectivity into the device.

THE SCOOP

Galaxy Tab 10.1 with 4G LTE

by Samsung, starts at $530 (plus storage capacity options, network data plans)



▶ **What it is:** If you're looking for a tablet that's not an iPad 2, the Samsung Galaxy Tab 10.1 should definitely be on the list of other tablets to consider. From a technical standpoint, it's got many of the same (if not better) features and specifications as the Apple competitor, and there should be enough apps within the Android Marketplace to satisfy your needs to customize the device.

▶ **Specs:** A 10.1-inch widescreen (1280-by-800 pixel LCD); 1GB of RAM (up to 32GB of storage capacity); Wi-Fi; 1GHz dual-core NVIDIA Tegra 2 processor; two cameras (2 megapixel front-facing, 3 megapixel rear camera for photos and video at 720p resolution); Android Honeycomb OS; and the ability to watch movies (built-in Flash lets you view videos on websites that may not play on the iPad), play music and access Google's services and other apps through the Android Market. It's about the same size and weight of the iPad 2.

▶ **Why it's cool:** The 4G LTE data access from Verizon Wireless gives this tablet a big jump over the iPad 2. While most people will likely be fine with Wi-Fi access only, connecting via 4G LTE offers faster data access and speeds for places beyond what Wi-Fi covers. This can be valuable for in-the-field workers, or for out-of-the-way spots that you may find yourself in. Having 4G access compared with 3G access is a big difference, too: In our tests, we received more than 20Mbps of download speeds on a regular basis within the 4G coverage area.

▶ **Grade ★★★★★ (out of five).**

THE SCOOP

HP Pavilion dm1 notebook (dm1-3010nr) with 4G LTE

starts at $600 (with two-year data contract)

▶ **What it is:** This is a combination of a notebook and a netbook, giving users the performance of one and the mobility of the other. Features include the 4G LTE Mobile Broadband support (can also connect to Verizon's 3G EV-DO network where 4G isn't available), integrated Wi-Fi (802.11b/g/n), a 320GB hard drive, 2GB of RAM, Windows 7 OS (Home Premium), a built-in webcam, six-cell lithium-ion battery and an 11.6-inch LED screen.

▶ **Why it's cool:** I'm not particularly a big fan of netbook devices, because what they give you in terms of portability you have to give up in performance, storage capacity and battery life. So the coolest part of the dm1 for me was the 4G LTE access. In my tests, I could get download speeds of 29.62Mbps in Framingham, Mass. (in the same area as a 4G cell tower), and average upload speeds of about 10.59Mbps. At my home near Worcester, Mass., I was able to achieve 28.10Mbps of download speeds on average, and about 8.23Mbps of upload speeds. For comparison, my home broadband speeds were a comparatively pathetic 4.85Mbps of download speeds, and 1.06Mbps of upload.

▶ **Some caveats:** The keyboard is too small and although an 11.6-inch screen may seem big, on a notebook it's not, especially when you're used to a 15- or 17-inch display notebook.

▶ **Grade ★★★⯨**

▶ **Costs vs. benefits:** The big decision with 4G LTE is whether the user's data usage will fall within the realms of the data plan. For access to the 4G network, Verizon offers 2GB of data for $30 per month, 5GB for $50 per month or 10GB for $80 per month. Verizon does a very good job at helping you estimate your data usage, offers data usage monitor tools and will send alerts if you're getting close to your limits. Both devices also let you connect via Wi-Fi if you need it. The bottom line of 4G usefulness, then, comes down to access (is 4G the only option for on-the-road travelers?), as well as amount of time and data used by the end user. If the user can stay within those limits without worry, the gains in network speed are well worth it.

Shaw can be reached at kshaw@nww.com.

techdebate

EXPERTS FACE OFF *on the* HOTTEST TOPICS

Is a tablet a PC?

Revolution, not evolution

Matt Asay is senior vice president of business development at Strobe.

TABLETS ARE OFTEN CAST AS the evolution of the PC, but this is wrong. Tablets are different.

While tablets pay homage to the PC — sometimes requiring manual inputting of data via physical or virtual keyboards, depending on the app being used — they differ in significant other ways. Microsoft Chairman Bill Gates has tried to tie the two worlds together, claiming that tablets, like PCs, are software-centric, without acknowledging that the nature of that software has changed, and often dramatically.

Perhaps the reason we have tablets at all is that the personal computer never really delivered on the promise. It was never all that personal. PCs were initially heavy lumps of plastic that lived somewhere in the home or office. Later came the laptop and netbook, and each step made the PC a bit more personal.

The form factor itself, however, was never truly personal. Nor was the software. Sure, some people put stickers on their laptops and changed their screen savers, but the PC's file system imposes a somewhat impersonal interaction with it, and the closest a PC ever gets to being cradled is sitting stiffly on someone's lap.

Tablets, and the software that runs them, however, are inherently personal. From day one.

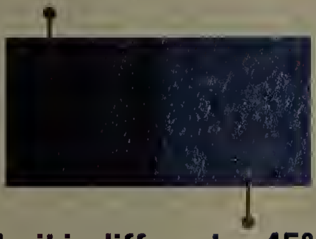
Tablets significantly depart from their PC predecessor in ways that make them a new species altogether, rather than an evolution. Consider, for example, that early on Microsoft came out with its own tablet/slate device, and the very fact that it was a hybrid of the old world (PC) and the new (smartphone) vaporized its chances.

The new world of tablets, however, is very different. Thin, relatively light, and completely dominated by a touchscreen. The brain of these tablets has changed, too: Initially it was traditional Windows running on a pseudo-new form factor. Today's tablets bury the file system and run a lightweight OS that gets out of the way of the apps that increasingly dominate our time and attention.

And while these apps span an array of functions, they skew much more personal than applications on old-world PCs. Instead of fixating on the creation of Office documents we carry around Instagram, Facebook, LoseIt, etc. Yes, these services also can be available on traditional PCs, either as native or Web apps, but they are increasingly built with

► *See* **Asay,** *page 22*

Is a tablet a PC?



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Just a new form factor

John Obeto is CEO and CTO of Logikworx.

PC. PERSONAL COMPUTER. AS IN a personal computing device. A tablet is both a computing device, and, in most cases, is personal.

The newest champion of the so called "post-PC" world is the tablet. Unfortunately, for all the promise it holds for mobile computing, a tablet is simply a computer, albeit mobile.

Whenever you see people using tablets, you can separate them into two groups, just as you can "traditional" PC users: entertainment/multimedia consumers, and productivity users. In both cases it is the apps that bring desktop functionality to tablets. You can, for example, edit video on an iPad. What's more, you see productivity users adding wireless keyboards and other peripherals to tablets, unconsciously re-creating laptops!

Tablets are PCs.

A few months ago, I read a *Network World* blog where the author took issue with Microsoft's Andy Lees' assertion that Microsoft views tablets, a.k.a. slate-form factor devices, as PCs. The writer made some arguments that, while seemingly on point, don't hold water. Let me point out a few:

Network World: "The only tablets on the market today that are full PCs are Windows 7 tablets, and they are failures. Microsoft is adding a new tablet-optimized interface to Windows 8 that will run in addition to the traditional Windows interface, but it doesn't make sense to jam a full PC operating system into a device that is more ideal for consumption, rather than creation of content. HP already realized this when it shifted from Windows tablets to the TouchPad, based on webOS."

As noted, the apps make any tablet the equivalent of a PC. Microsoft coming out with an optimized interface for the platform doesn't change that fact; it is simply a reaction to market dynamics. It would be foolish for any player, including Microsoft, to simply ape the iPad. Copying the iPad at this point would force Microsoft to play in Apple's sandbox. By expanding the PC utility of slate devices Microsoft will attempt to redefine the battlefield for tomorrow.

And why not Windows on a tablet? I am at a loss as to why it is OK for webOS, a Linux variant, to be an acceptable tablet OS, while Windows is looked at askance. Especially since the user experience on

► *See* **Obeto,** *page 22*

▶ **Asay,** *from page 21*

smartphones and tablets in mind, with the PC an afterthought.

The PC is all about getting work done. The tablet has a day job, but spends as much or more time having a life.

Though a tablet is not a phone, it has sociability built into its DNA. A tablet like the iPad comes with GPS built in, and likely has 3G wireless at the ready, too. PCs also can be social, of course, but that social DNA feels like more of a bolt-on.

And it's not just social. For tablets, the apps are the operating system. When using my iPad I'm married to individual apps, not to iOS.

The PC, on the other hand, is constantly reminding users of the OS. The primary affinity is for Windows, Linux or Mac OS X. This feeling comes through in the need to interact with the file system on a regular basis, the bother of installing apps, etc.

Microsoft still doesn't get this, which is why *Chicago Sun-Times* columnist Andy Ihnatko raves about the new Windows 8 tablet interface but pauses to shudder, "Every time the classic Windows 7 interface pops up, it looks like a drunken uncle at an otherwise elegant family wedding."

The tablet experience is different. This is why Apple has been retrofitting Mac OS X to be more iOS-like, rather than trying to make iOS more Mac OS X-like.

Apple is winning because Apple groks this shift in how we use "computers." The tablet has out-personalized the personal computer. Vive la tablet revolution. ■

Asay is senior vice president of business development at Strobe, an HTML5 startup that provides a framework and cloud services for building cross-platform mobile apps. He was formerly COO of Ubuntu commercial operation Canonical. Asay is an emeritus board member of the Open Source Initiative (OSI). You can follow him on Twitter @mjasay.

▶ **Obeto,** *from page 21*

Android-based tablets is crap, from a general consumer's point of view. The contrast in user-friendliness between either Windows Phone 7 devices or the iPhone and any Android phone is telling, a problem that has jumped to tablet devices as well.

Into that breach would come Windows 8, with a new, touch-enabled interface, and total support for current apps and complete fidelity for users' data. That doesn't mean existing tablets aren't PCs. It means future tablets will be better than those available now.

Network World: "Applications like QuickOffice, and Bluetooth keyboards let tablet owners do a bit of work in a pinch, when they're not near a full computer. But the appeal of the devices is an easy-to-use operating system combined with apps that let you watch movies, play games and read articles in fancy news aggregators like Pulse and Flipboard. Work on a tablet, or a phone, is usually a quick edit to a document, not creating a complicated spreadsheet."

This statement perpetuates the assumption that tablet users only consume content. Not true. Even with the iPad, tablets are being used for content creation, and Windows tablets will definitely do more. Here, the writer is conflating tablet use by outliers with that of businesspeople who purchase slates to be productive.

At the recent Microsoft Build conference in Anaheim, Calif., Microsoft put the discussion to rest with Windows 8. Windows 8 spans tablets, notebooks, netbooks and desktops, creating a unified computing experience across all those format genres.

They are all PCs, they just come in different form factors. ■

Logikworx is a managed services, systems and security solutions provider for SMBs focused on creating 100% Windows-based solutions built around Microsoft technologies for the desktop, server, mobile and cloud infrastructures.

➔ **Send Debate Suggestions** to jdix@nww.com

Tablets are the new PC

➔ Let's open our eyes a little and realize that tablets are becoming the new PC. We like to do things on the go without being tied to our offices. As more industries are starting to use tablets, more apps are becoming available. It is our nature to adapt to the environment that we are in, so as tablets become increasingly mainstream, we will use them more in our everyday functionality. What slows progress down is the close-minded few who refuse to adapt to changes in technology. **MIKE WILSON**

Internet portal toys

➔ Today's tablets are Internet portal toys, nothing more. I can't believe that some of these top-credentialed IT folks would even pen their names to a statement that considers these iToys to be anything close to real computers.

If you can't load an actual software program on it, it's not a PC. This line of nonsense, including the idea these toys will be the demise of desktops/laptops, is moronic; I would seriously consider letting any CIO go who tried to maintain that these toys hold any value in business on the same level as a real computer. **TPCOCK**

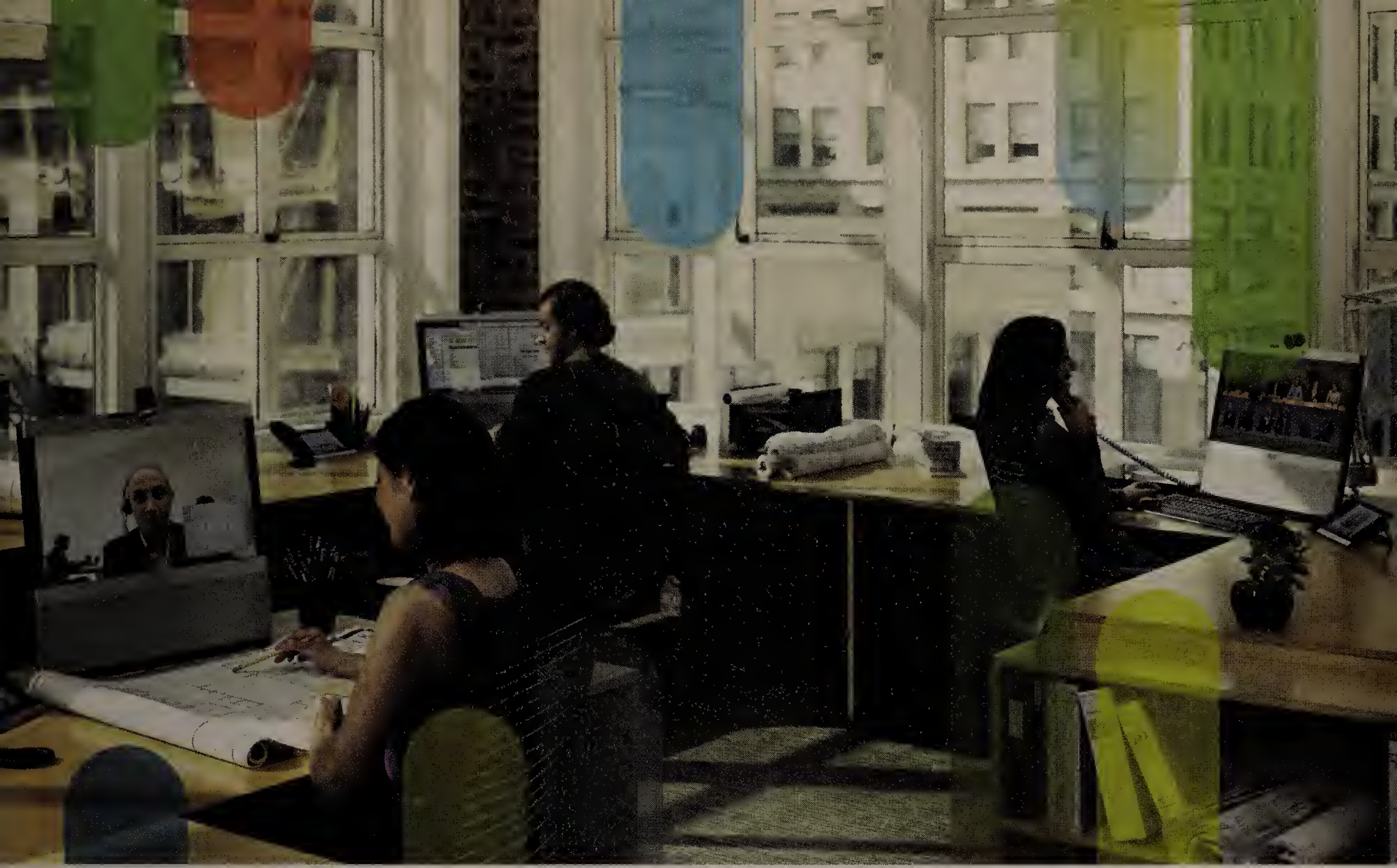
Tablet is to PC as bicycle is to motorcycle

➔ The PC is as different from the tablet as a bicycle is from a motorcycle. Granted, with enough work, the tablet could run LIKE a PC, however, it never will be a PC. Tablets as they stand today are more for consumption. Try to type a 100-page dissertation on a tablet; try to play Angry Birds on a PC. Neither offer the same experience as the other. With tablets, the market is trying to force touch/voice commands and gesturing in places where it doesn't quite fit sometimes. With PCs, we have the time-tested physical feedback so many people have grown accustomed to, as well as a large variety of hardware and software to choose from. Hopefully someone will find a real-world use for the tablet soon, or else people might be reminded that they can do everything on a PC and probably better/faster/cheaper. **JON**

About the OS

➔ How are PCs/Macs reminding users of the OS any more than are iPads and Android devices?

Also, you don't have to really interact with the file system on a PC — if you use the default location, things get saved into "My Documents." And you need to "bother" installing apps on all those platforms. A few PC apps have complicated setup, but this has nothing to do with whether a tablet is a PC or not. **BRYAN LEE**



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CLEAR CHOICE TEST: TABLET COMPUTERS

Business class tablets vs. iPad 2

Fujitsu Stylistic and GammaTech Durabook are strong contenders

BY TOM HENDERSON

Tech lovers have been flocking to the iPad 2 and other tablets in order to watch movies, read books, surf the Web and make video calls on the latest, greatest, thinnest, lightest, coolest devices. But where do tablets fit within the enterprise?

We tested 10 tablets to see which had the strongest set of business-related features. Our test subjects ranged from the high-end $1,699 GammaTech Durabook (a tablet/notebook hybrid) to the $279 Archos 70 and everything in between, including tablets from Fujitsu, RIM, Acer, ViewSonic, Toshiba, Motorola and, of course, Apple. We even tested a $79 no-name tablet from China.

We focused on business-related features, such as business-oriented programs and apps, security components, developer programs poised toward the enterprise and accessories targeting business use. We also looked at battery life and Java-based browser performance.

Two tablets stood out: Fujitsu's Stylistic, and the GammaTech Durabook. Apple's market-setting iPad 2 has obvious strengths, but also suffers from a mixed feature set. Here are the individual reviews. ➔

Apple iPad 2

THE GOLD STANDARD

The clear consumer market leader, the iPad 2 has business features that are often underplayed. On the other hand, it lacks several features that we feel are important.

The iPad 2 can be obtained with Wi-Fi only, or Wi-Fi and 3G. Apple uses a certificate-based system for downloads, the Apple Push Notification Service. Developers are required to obtain certificates that in turn, allow communications to be pushed to Apple iOS 3-plus devices, whether 3G or Wi-Fi-connected.

These "push certificates" authenticate the message payload, often an application or a policy toggle. A device, when connected to 3G mobile networks, can receive pushed messages.

The iPad 2 is initialized and backed up through iTunes. Its chain of authority comes through iTunes, and/or subsequent push-type messages that arrive from Apple or Apple-authorized systems. These systems must have encryption and authenticating certificates that allow Apple to communicate with the iPad via its operating system, iOS.

Mobile device management (MDM) software packages usually use this chain of authority, to communicate bidirectionally with an iPad 2. This allows policy enforcement, like software authorization, remote kill and other policies to "enwrap" iPad 2 use. Tablets can be secured in this way against unauthorized access via

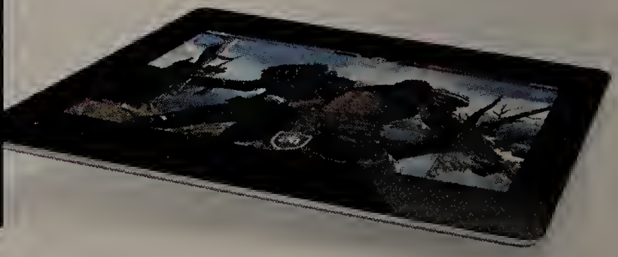


ILLUSTRATION: HUAN TRAN

NETRESULTS

Company	Apple	Fujitsu	Research in Motion	Acer
Product	iPad 2	Stylistic Q550	BlackBerry PlayBook	Iconia Tab W500
Price	$499	$849	$599	$619
Storage	16GB	64GB	64GB	32GB
Display	9.7 inches	10.1 inches	7 inches	10 inches
Pros	The market leader and gold standard; strong security, tons of apps	Business-smart, well-designed, easily replaceable battery	Light, fast, part of the BlackBerry ecosystem	Fast, comes with keyboard
Cons	Targeted at consumers, weak peripheral connectivity	Relatively low battery life	Limited business features	A bit of screen glare

password failure shutdowns, and prevention of unauthorized software installation.

Apple offered us a free "Find My iPad" subscription that locates a unit, and can wipe the iPad if necessary. Enterprises that already have this capability through third-party mobile management software may wish to disable this function.

Enterprises may also want to enforce policies that suppress Bluetooth peer connectivity, as well as front and rear camera and microphone use. To their credit, Apple suppresses USB connectivity so there's no need to worry about data walking out the door on a USB drive.

Apple doesn't support Adobe Flash, claiming that Flash use has a direct bearing on battery life. In our battery tests, we got nine-plus hours of use on Wi-Fi.

The issue of battery recharging comes into play in a scenario where the device is being used for multiple shifts -- a hospital setting, for example. We found it took a little more than three hours to charge the battery via USB while the unit wasn't in operation.

The iPad 2 has Bluetooth available for headphones and keyboard attachments, but Bluetooth can't be used for file transfers between systems. The iPad 2 supports 802.11a/b/g/n-2, where n-2 is dual band and offers more available free channels in dense environments. The iPad 2 also comes with a connector that allows it to be controlled through Microsoft's ActiveSync processes.

ActiveSync allows administrators of Microsoft Exchange to control the device through various policies. Mobile Device Management applications to use ActiveSync to discipline deployed devices.

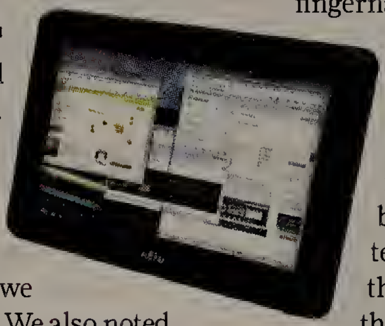
Unless it is jailbroken/rooted, the iPad 2 lives inside of a closed-loop delivery system, where organizational policies delivered via Microsoft ActiveSync or other MDM software are possible. Applications can be delivered via Web page access. Apple permits organizational application stores, as well as possible controlled access to its enormous App Store.

However, there are downsides. There is no removable or user-serviceable battery. The only network connection is through Wi-Fi/3G wireless; no Ethernet or Bluetooth tethering is possible. Memory and storage isn't field upgradable. There is no case or protection bag/device shipped with base units. Keyboards, sound devices and external printer connectivity devices are possible, but were optional and not tested.

Still, Apple's iPad 2 is the one to beat. The subjective look and feel are strong, and mobile device management controls can contain iPad 2 use through pushed, authenticated policy control. Backup must be done through iTunes, a program whose security strength is tied through the aforementioned chain of authority for push messaging.

Fujitsu Stylistic Q550

A STANDOUT, BUT PRICEY



The Fujitsu Stylistic stood out for several reasons. It runs Windows 7, and very well. There's a stylus, which was useful as the screen resolution is high and we gained precision with it. We also noted that the Stylistic has a user-replaceable battery, making this the only tablet tested that might be good for three shifts per day of mobile use. The battery takes seconds to change and seems to fit well.

There are also buttons to lock the display aspect (portrait, landscape, upside-down, upside-down portrait; rotational in three positions) although the display can also autosense position. Another button pops out a keyboard displayed on the screen. There is a front-facing camera, and a button to shoot pics.

Integrated into the side bezel are switches that turn the device on and off, but also turn the Wi-Fi on and off. While Wi-Fi can be controlled through policies, it's easier and more secure to have the ability to turn Wi-Fi off.

The Wi-Fi is IEEE 802.11 a/b/g/n and dual-band n (and Bluetooth 3.0, too). There are several ports, including an integrated fingerprint scanner, full-size HDMI and USB 2 jacks, and a jack for noise-canceling headphones. The tablet seems well-sealed physically, and there's a license for McAfee antivirus.

Fujitsu also includes a version of Microsoft Office called Microsoft Office Starter 2010, which doesn't include PowerPoint or Outlook, although there's an easy upgrade. There's an additional memory port (base is 32GB or 64GB, which we tested) that's SD/SDHC-compatible for additional storage needs.

We found the visual keyboard easy to use with our fingers, but as mentioned, the stylus seemed to be helpful for fine-resolution control of window sizing, drawing and other needs where fingertips didn't work well. Long fingernails often don't suit tablet touch sensitivity, and we found that problem here. The 1280-by-800 pixel, 10-inch anti-glare screen was also helpful.

The Q550 seemed the most business compatible. At $729 (32GB, lower battery life) to $849 (64GB, higher battery life), it has less potential storage than the Archos 70. But in other ways, this Intel Atom CPU-powered tablet is most likely among the non-Apple tablets to make it into offices.

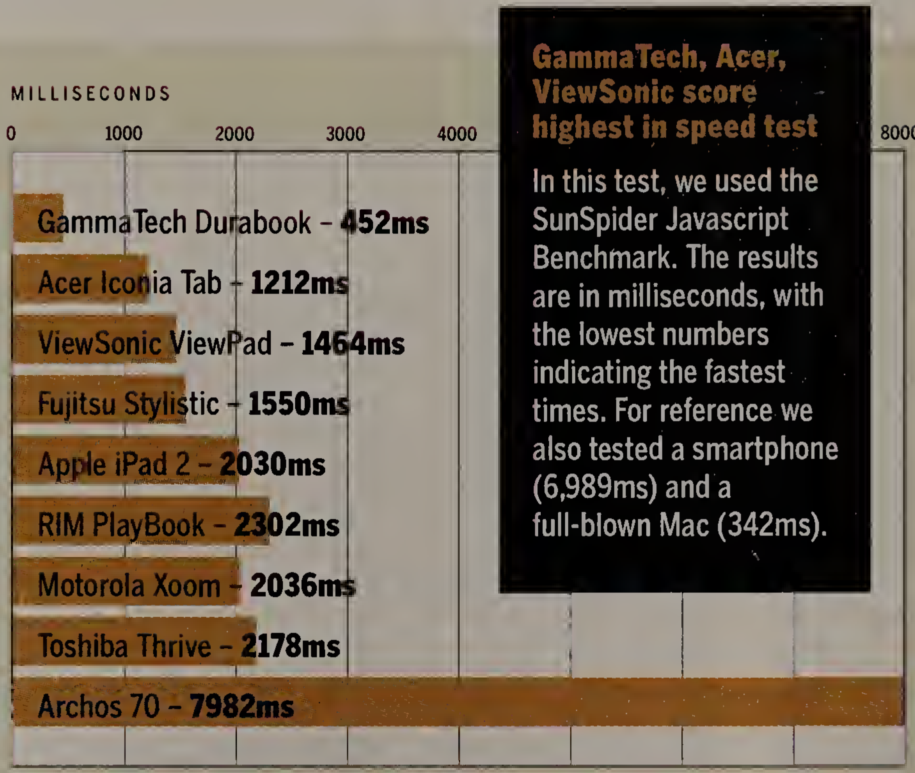
RIM's PlayBook

FOR BLACKBERRY LOVERS ONLY

RIM's BlackBerry PlayBook is a 7-inch notebook that runs the QNX operating system, but will soon be allowed to run a limited number of Android packages, we were told. Some of the PlayBook features are enhanced if there's a BlackBerry phone nearby, as they tether together, Bluetooth-

ViewSonic	**GammaTech**	**Archos**	**Toshiba**	**Motorola**
ViewPad 10Pro	Durabook U12C	Archos 70 tablet	Thrive tablet	Xoom
$749	$1,699	$279	$479	$499
32GB	60GB	250GB	32GB	32GB
10 inches	14 inches	7 inches	10.1 inches	7 inches
Good display, Android apps	Rugged, has fingerprint scanner	Fantastic storage, inexpensive	Good battery life, fast	Well-designed, fast
Needs software fit and finish	Hybrid device is bigger, bulkier than pure tablets	Runs older version of Android	Minor software problems	No specific business features

GammaTech, Acer, ViewSonic score highest in speed test



In this test, we used the SunSpider Javascript Benchmark. The results are in milliseconds, with the lowest numbers indicating the fastest times. For reference we also tested a smartphone (6,989ms) and a full-blown Mac (342ms).

style, to deliver additional RIM applications, contacts, and email via a software package from RIM called Bridge.

Barring a BlackBerry phone nearby, the PlayBook is more limited and organizational resources must be accessed via a browser, or through the use of optional VDI applications.

Fortunately, the browser is easy to use, and we were able to get to organizational Web-based email and other sites via Wi-Fi as we might normally do. RIM's control of BlackBerry smartphones via its Business Enterprise Server doesn't extend yet to the PlayBook, although there are third-party applications that claim they can control the PlayBook's features and policy sets through agent-based control.

RIM's PlayBook

Setup requires a BlackBerry account, just as the Apple iPad 2 requires an Apple ID. Our unit downloaded about 80MB of updates before it would initially wake up, and installation was trivial. The PlayBook has several ports, and connectivity through them is simple, but there are no printer drivers. Bluetooth support is very strong, and also allows one to connect as a peer (tethered) to a PC, Mac or Linux machine for file transfer purposes, something that Apple doesn't support.

We were concerned that the PlayBook didn't lie quite flat on a surface. It rocked very slightly when we typed or swiped. It had a bit of a Middle Eastern feel, as swipes are right-to-left, rather than left-to-right. The PlayBook is sent in a carrying sack, unlike every other unit sent.

We wish there was more to it. RIM has a developer network and an application store for the PlayBook, but the number of applications available in the pre-Android phase that we examined are but a fraction of the diversity available for Android and iOS. The Blackberry Tablet OS is currently based on QNX, originally a Real Time Operating System (RTOS). RIM last week announced a merger of QNX with the BlackBerry phone OS into the "BBX Platform."

If you're a BlackBerry owner, the PlayBook becomes a new member of the BlackBerry ecosystem. The program load lacks ActiveSync, or even RIM's BES control. The PlayBook has great origins, but needs to evolve before it's ready for widespread enterprise use, unless there's a BlackBerry culture already there.

ViewSonic ViewPad 10Pro

WIN 7, ACCESS TO ANDROID APPS

We were surprised to boot the ViewSonic ViewPad 10Pro and find Windows 7 Professional Edition smiling back at us. One of the principal benefits of the 10Pro is that it uses a pretty generic, if slimmed, version of an operating system that few people need to relearn: Windows. The 10Pro is a 10-inch tablet that runs Android apps in a hypervisor-like arrangement via a program called BlueStacks Alpha.

The BlueStacks app loads selected applications through the Amazon app store for Android. We had trouble with network connections via BlueStacks and can't currently recommend it, unless you obtain Android apps and paste them into the suitable directories.

The 10Pro can be used with a keyboard connected through its USB port, and we found ourselves relying on one, as the supplied touch-keyboard often covered the application we were using, opaquely. We couldn't see what we were typing. Smartphone users that use Swype keyboard can use it alternately, and its autocompletion memory feature may benefit those frustrated with the on-screen keyboard.

Although the 10Pro has dual Intel Atom processors running at 1.5GHz, we had numerous occasions where the keyboard input was stanched by performance slowdowns when doing things like simple file searches. The keyboard will indicate when a key has been touched by a small highlight on the key. We needed that a lot. Windows pop up in Windows 7 that don't auto-size on the display correctly, leading to much unnecessary scrolling to view the contents of the windows, especially buttons at the bottom of windows. There are built-in touch buttons on the sides of the display which were useful, but didn't translate well when we used BlueStacks.

We found the battery life impressive, even though the 10Pro was slightly heavier than other 10-inch tablets we tested. The unit could run with our battery test application for nine-plus hours, and recharge time was less than the typical three hours. There is only a front-facing camera on the 10Pro, and there is a full-size USB connector, an HDMI connector, headphones connector and an uncovered docking station connector at the bottom; it looked like a great place for crud to enter the connector and possibly the unit. An SD-size memory connector is included that can augment the native storage if desired.

Overall, we were impressed by the ViewSonic 10Pro unit, but

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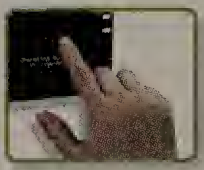

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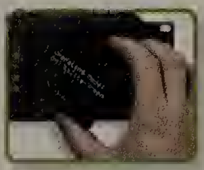

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it seems to need Windows and BlueStacks optimization, individually. The keyboard app was difficult, and the performance occasionally very slow. Nonetheless, familiarity with Windows could make the 10Pro popular and the display was crisp and legible — something one might expect from ViewSonic, a large display maker.

GammaTech Durabook U12C

RUGGED, INDUSTRIAL-STRENGTH DEVICE

The Durabook U12C is a hybrid system. It has a base of a notebook, but a tablet-like touch screen that's built for durability. There's a heavily ruggedized case that's larger than several notebooks, but its touch screen is both bright and useful. The resolution of the touch sensitivity of the screen is very good, and because of the higher resolution in this 12.1-inch screen, we found that using a stylus produces very good results. Fortunately, there's an included tethered stylus that works well for just this purpose.

The Durabook runs Windows 7, on top of an Intel Core i5 chipset with two 1.33GHz cores, 4GB of user memory and a 60GB hard drive. The unit has a fan, and despite the fan, we could get five hours of battery life running our browser test. Charging took two and a half hours. As there is a large notebook base, there are a lot of jacks, including HDMI, plenty of USB jacks and even Gigabit Ethernet. The full Wi-Fi spectra is supported, 802.11a/g/n with dual-band n.

We found this is a huge unit to lug around compared to the other tablets we tested. What differentiates it is are features that are useful, along with its touch screen, tablet-like capabilities. The first differentiator is a biometric authentication sensor on the touch screen bezel. It's a fingerprint scanner and it worked simply, and we couldn't thwart it in our admittedly mild testing. Data Guard, a backup program, is included as well. Windows 7 can be controlled by a number of MDM packages.

The Durabook is the kind of device we would have no problem taking to a construction site, outdoors, or many sites where a tablet would seem in danger of some kind. Although the case has a plastic feel, rather than the more solid feel found in the iPad 2, the Archos 70 and the Fujitsu, we liked its case for its ability to be banged around. Its implementation of Windows 7 works more readily than the ViewSonic program for its attention to detail. But yes, you could look at the Durabook and say: It's a notebook with a touch screen, not a true tablet. The screen can be spun around and folded down to make it into a tablet, albeit a fairly huge tablet.

But the Durabook is a hybrid, and makes no apologies about being something you cannot possibly put in your pocket. This is an industrial-grade machine with very high-resolution screen/touch capabilities, and with attention paid to business needs in the form of pre-loaded apps and a fingerprint reader.

Archos 70

ANDROID-BASED 7-INCH TABLET SPORTS TONS OF STORAGE

The Archos 70 is a generic, but well-designed 7-inch tablet that runs Android 2.3. Although it has a generic program load, similar to our Droid smartphones, the small touches it has were meaningful.

First it has an astounding 229GB (250GB gross) of free onboard disk space. System flash storage was 1.45GB. For a 7-inch tablet, the capacity is enormous. The unit has a camera, and more interesting, it has a dog-leg stand. There's an HDMI port, a micro-USB port and a proprietary charger unit. There's an SD card interface for additional storage, or more rapid transfer of data into and out of the tablet.

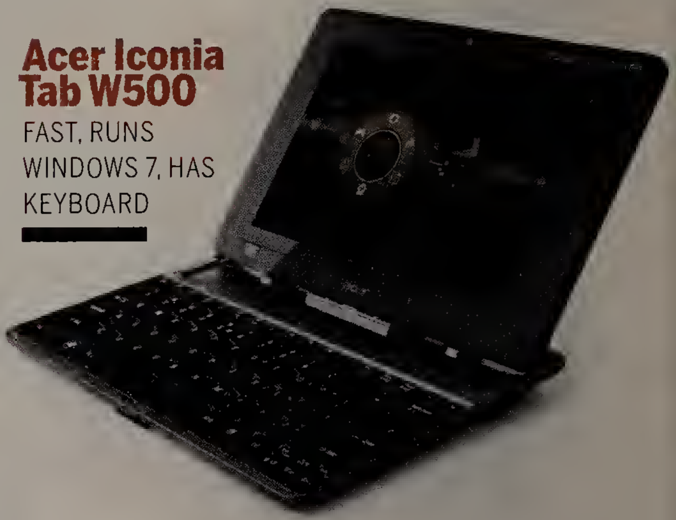
The unit booted up with a splash screen stating: "ARCHOS Entertainment your way," which didn't lead us to understanding the positioning of the tablet towards business cases. Android 2.x is easily controlled by third-party MDM applications, and we were tempted to root the unit (for tethering purposes) until we found that it can be tethered via USB or Bluetooth from the box. Wi-Fi via 802.11b/g/n (not dual-band) is supported.

Lacking specific business software or accessories, the business case is weaker for the Archos A70. What impressed us was fit and finish, along with huge storage capabilities. This is the unit on which to load an entire library of videos or other large files and take off for a few hours. Battery life was about seven hours, although the unit recharged in less than two hours. For a personal device, it's a contender, but the A70 will need to be bolted down by policy control/MDM software for business applications.

Archos 70

Acer Iconia Tab W500

FAST, RUNS WINDOWS 7, HAS KEYBOARD



Outside of the Durabook (which is a hybrid), the only other unit that came with a keyboard was the Iconia Tab W500. Driven by an AMD C-50 processor, the only one in this review, the Acer was fast, and used Windows 7 Professional 32-bit for its operating system.

There were several useful customizations, including a Migration and Synchronization Wizard that allowed data to be synced between a Windows 7 machine and the W500 tablet.

We tried the sync tool. It uses a flash drive, and it works pretty quickly to initially back up settings on the W500, then installs a Windows ".msi" setup file for a host; we tried Windows XP and 7. Both worked, although the installation was quirky on Windows 7. Installed onto a "host" system, one checks a box associated with the files or folders that might be synced. Outlook, unfortunately, wasn't an option, but POP3 mail could be synchronized and entire folders, shortcuts and other settings, along with video, music, pictures and documents, could be check-marked for transfer. It worked swimmingly.

The connection between the keyboard and the tablet isn't as solid as we'd like to see, and the device doesn't quite balance on a lap, although it's largely stable enough on a flat desk, but perhaps not on a commuter train. That said, the keyboard was quite convenient to use and a nice standard accessory.

The W500 also has numerous adaptations for Windows 7, including a screen keyboard that we judged to be the best of the Windows 7 tablets we tested. The high-resolution display (1280-by-800 pixel) was crisp although it showed a higher than normal surface glare, especially outdoors. Jacks on the unit include a full-size USB on the bottom and HDMI jack, along with a proprietary charger connector and an SD memory card slot. A button on

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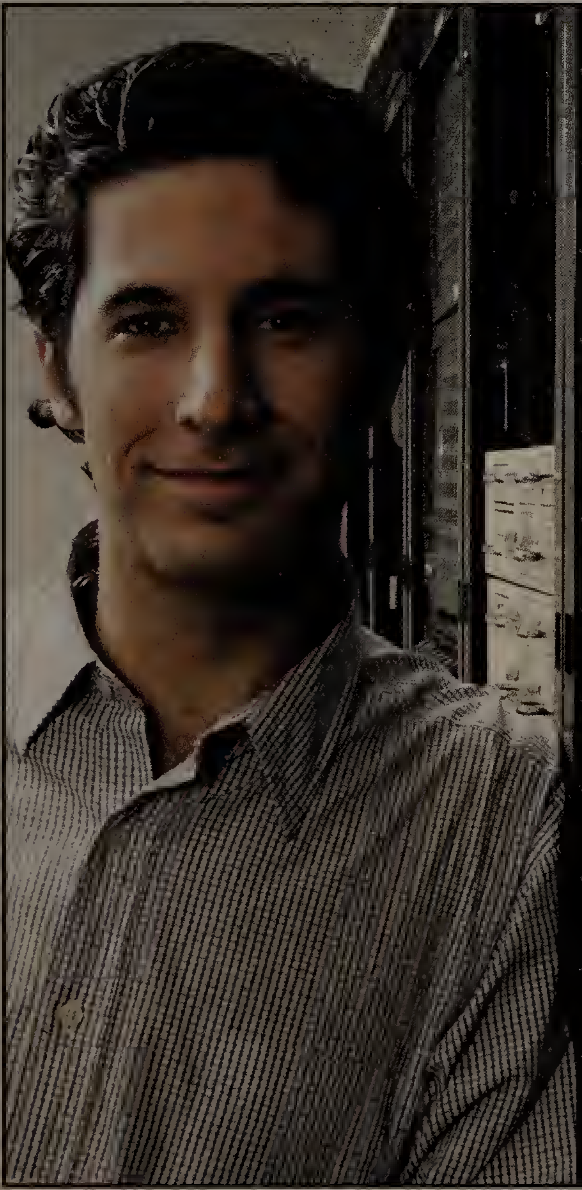

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the front-lower bezel starts the unit and also serves as the traditional Windows "Start" button. There are also jacks for headphones, an on/off button and a front/back webcam. We worried, though, that all of the holes, jacks and buttons might make the unit more susceptible to spills and such.

Overall the Iconia W500 is bright and crisp and Acer has made decent adaptations for Windows users to join the tablet to its devices in a meaningful if rudimentary way.

Toshiba Thrive

ANDROID-BASED 10-INCH TABLET LACKS BUSINESS CASE

A larger, 10-inch tablet, the Toshiba Thrive uses the Android 3.1 (a.k.a. Honeycomb) operating system. Its larger form factor has the addition of an external proprietary power supply that needs to be kept with the tablet to charge it, rather than the USB-charging with others in our tests. The Thrive had an excellent initial nine-hour life in our active battery test. The case of the Thrive is rubberized, and seems to be less prone to both slipping and dings. There's no special program load, although there is a bundled version of QuickOffice, which is a file viewer application.

We found some quirks. Updates can only be viewed in the Portrait position. Some applications reacted badly if a network connection wasn't available. For example, if we started the pre-installed News update without a network connection, it would hang, as though it didn't realize there was no network available. The Thrive arrived with Kaspersky antivirus trialware, which was heartening.

The Thrive tablet has jacks on two sides, one for the proprietary power connector, but also micro and standard USB jacks (which the unit can't charge through). There is a docking station port so the Thrive can be attached to an optional keyboard. We noted that the cover for the connector isn't tethered to the case, and it immediately fell under a table behind a trash can. The cover for the USB and HDMI jack may also be quickly lost in the same way.

There are two cameras in the Thrive on the top of the unit, one facing frontward and one facing rearward. The photo and video quality were the same, unlike the dual cameras in the iPad 2, one of which is good for stills (rear-ward-facing), but better for video (pointed in a web cam position, frontward). We found Wi-Fi good, but not the best, as dual-band 802.11n isn't supported. There is also no support for MDM software agents from Toshiba, so third-party Android MDM controls are necessary to add policy and security control to the unit.

On the low side, the Thrive reminded us of our Android-based smartphone; not much different in program load. In a way, it's like using a giant smartphone. That said, it had the second-best case and had a light feel for its size and a steady position where we left it. Other optional components can be accessorized to match the case, like a keyboard docking station. We liked the Thrive, but it didn't prove much of a business case to us.

Chinese no-name device

YOU GET WHAT YOU PAY FOR

To see what's available at the low end of the tablet spectrum, we purchased a 7-inch Chinese non-branded Android device from a supply house in China for less than $80. It took approximately three weeks to arrive. To our surprise, the seven-inch device came with a proprietary docking device that had USB and even an Ethernet port attached to it. The Android version was 2.3, and the battery life was negligible, about five hours idling, three hours in our test.

It was as slow as a slug, with essentially the same program load as our Android smartphone. The touch screen, however, was a misnomer, and required what we felt was an excessive amount of force to perform basic work. It worked 11 times. We don't know how to get it serviced, as it's dead now.

When it lived, it had several important differences: It used SD memory to add to its nearly 1GB of on-board storage. It had 802.11b/g Wi-Fi, not a or n. What it did have that all of the other units tested did not (save the hybrid Durabook), was a small dongle with two USB ports and Ethernet. We were amazed at this.

Motorola Xoom

WELL-MADE ANDROID DEVICE, SHORT ON BUSINESS APPS

We've used the Motorola Xoom before, during our MDM tests. It's one of three units we tested that has cellular capability. It's loaded with Android Honeycomb 3.0.1, but there's only one application, Corporate Sync, poised towards business use. Motorola has an optional speaker dock, as well as a wireless keyboard, but these weren't tested. The Xoom internal drive can also be encrypted with a password.

The Xoom tablet is a Wi-Fi, or Wi-Fi and Verizon (CDMA cellular), device. It supports Wi-Fi 802.11 a/b/g/n dual-band, and so it's good for high-density Wi-Fi option needs. The Xoom we tested also supports Bluetooth, including Bluetooth file exchange; a Wi-Fi unit can also be used as an access point, subject to having a cellular data plan that's compatible. The Xoom has micro-HDMI and micro-USB connectors, inconveniently located on the bottom of the unit — also where the charger plugs in.

Inside the Xoom is a dual-core 1GHz processor with 1GB of internal storage and 32GB of storage. The Xoom has a charge time of about three hours, and our tests say it can stay running for almost eight hours on a charge. What disturbed us was a slight curvature of the rear of the case, that prevents it from lying perfectly flat. This led to a rocking motion of the entire unit when we touch-typed it, or swiped our fingers on the touch screen.

The 10.1-inch display was crisp, and then we discovered why: it has a resolution of 1280-by-800 pixels with a reduced-glare screen. There are two cameras, one 2 megapixel and mounted frontward, the other rearward. A slightly recessed button on the rear side snaps the "shutter" of the rear camera, which has a higher 5 megapixel resolution coupled to an LED flash.

In all, the Xoom was light and the case fit and finish seemed strong. Missing are business-specific software enhancements, but Android Honeycomb is well-known to MDM makers these days.

Overall

Were we a doctor's office, we'd have the Fujitsu Stylistic. Were we carrying an optional tablet, we'd be really easily seduced by the 250GB drive in the Archos 70, although losing that much data would give us great angst. The iPad 2 is lovely, if not very tough, and that's where the GammaTech Durabook comes in: most likely to be in our pickup truck next to the toolbox, connected to the inverter to charge its batteries. And if you'd like an inexpensive ex-Chinese tablet, let us know. ■

Henderson is managing director at ExtremeLabs, of Bloomington, Ind. Henderson can be reached at kitchen-sink@extremelabs.com.

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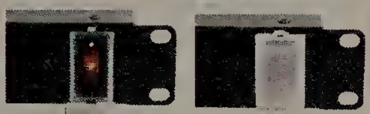

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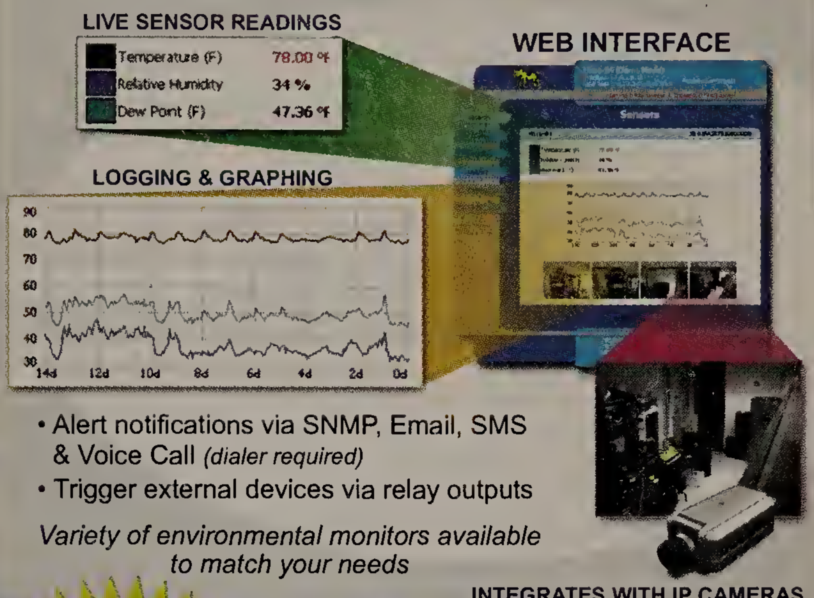

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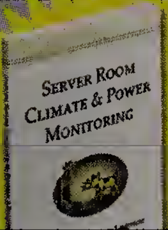

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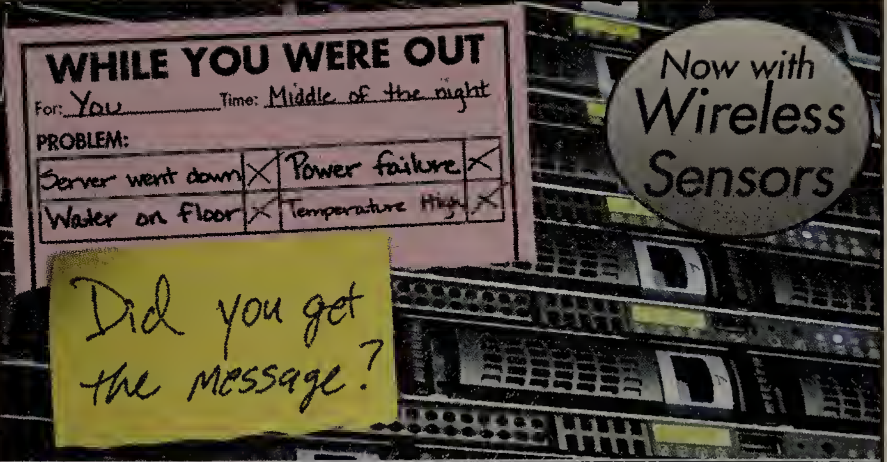

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▶ **Wi-Fi,** *from page 12*

go very fast," he points out. "Now, move the Ferrari to a five-lane highway [5GHz band] and you will be able to move a lot faster."

A better Wi-Fi highway

The IT groups are taking a number of steps both to build the five-lane highway and get clients to use it. As mentioned, many are redesigning their WLANs for 5GHz, creating smaller Wi-Fi cells and boosting capacity in the process, making the 5GHz signal pervasive. Wheaton College in Norton, Mass., is upgrading its dorm network from 802.11abg to dual-band 802.11n, with the access point placement based on 5GHz. "More in-depth shifting of clients to 5GHz will depend on our ability to expand 5GHz coverage," says Steven Hess, Wheaton network administrator.

UMass-Amherst's minimum system requirements for student and faculty include dual-band Wi-Fi-certified adapter, and before arriving on campus, students are given information on what they can do to "lower the overall noise in the 2.4GHz band," according to Tuthill and Dickson.

Additionally, more of them are switching on the automatic "band-steering" feature that WLAN vendors now support. When a dual-band client radio switches on, it "probes" for a wireless access point. The access point with band-steering temporarily "hides" the 2.4GHz band from the probe. So the client concludes that only 5GHz is available, and then connects using that band. Afterward, it's able to use 2.4 if needed for longer-range connectivity.

> **"You have a Ferrari, but if you are sharing a single-lane road with a lot of Ferraris, you won't go very fast.**
>
> **MARCELO LEW,** WIRELESS ADMINISTRATOR, UNIVERSITY OF DENVER

"In locations with band steering turned off, we have almost no 5GHz usage," says Ethan Sommer, associate director of core services at Gustavus Adolphus College in Saint Peter, Minn. "In our new academic building, where I turned on band steering, I think we have almost 4 to 1 in favor of 5GHz. I guess we should experiment with turning it on in more places."

Other changes include: setting up a separate SSID for the 5GHz band, and naming it something like "(university name)-fast" to encourage user adoption; and switching off the lower data rates for each connection mode, especially for 11b and 11g.

Many IT staffers say Wi-Fi problems are client-related, often due to aging or badly written drivers. Often, updating the driver fixes the problem. UMass-Amherst is trying out a new program of loaning students who report particular types of network issues a replacement USB Wi-Fi adapter that supports both radio bands. If the adapter solves the problem, the student is encouraged to buy and use the same model.

The influx of Wi-Fi clients that can only use the 2.4GHz band is putting the RF environment under stress. IT groups are responding with better spectrum planning, redesigning WLANs around 5GHz, shifting as many clients as possible to that cleaner band, and using the 2.4GHZ band more efficiently.

"I'd say the 5GHz band is our preferred future," says CMU's McCarriar. "But in the 'bring your own device' environment that many universities have lived in for years, we're ultimately at the mercy of the device vendors doing the right thing in designing and testing their products." ■

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CEO: Mike Friedenberg
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Brian Klunk, (415) 267-4514
ACCOUNT DIRECTOR, EVENT SALES, EASTERN REGION:
Michael McGoldrick, (508) 766-5459

BACKSPIN | BY MARK GIBBS

An update on the ECPA

LAST WEEK'S Backspin (tinyurl.com/3egbdd9) on Andrea Rossi's E-Cat power generator resulted in a ton of feedback, most of which discussed the impact such a technology might have.

What people are, I believe, responding to is the sheer excitement at something so powerfully transformative happening in their lifetimes. While that's great, it would be fantastic if we could get people as excited over other important topics. What I'm thinking of are things like the movement to get the Electronic Communications Privacy Act of 1986 updated.

Does that sound exciting? No! Of course not! It has all the thrill potential of a hangover ... which is actually just what the Electronic Communications Privacy Act (ECPA) of 1986 is.

Enacted in 1986, the ECPA extended government restrictions on wire tapping telephone calls to include intercepting electronic data transmissions.

At the time it was made law, which was pre-Web, pre-smartphones, pre-civilization as we know it, the ECPA made sense ... at least, it did if you were a raving bureaucrat.

The act was subsequently challenged over its applicability to law enforcement intercepting email and roundly criticized for its failure to protect consumer privacy. The reality is that ECPA is now woefully out of date. Since the ECPA was enacted, technology has evolved insanely fast and consequently the provisions are no longer appropriate.

Central to the complaints is that ECPA makes it ridiculously easy for government agencies to demand that service providers of any kind, including hosting, cellular, email and social networking providers, reveal user data stored on their servers. The agency just has to provide a written statement claiming that the data is relevant to an investigation involving foreign counterintelligence and no warrant is required.

In fact, one cellular provider, Sprint, tired of government agency demands for tracking subscribers, went so far as to provide a self-service portal for investigators to use with more-or-less no oversight!

And just as worrying is the issue that the act allows an employer to monitor any employee communications within the company with minimal reason.

On the other hand, violation of the act was the basis of the successful prosecution of the Lower Merion School District last year when the school administration used secret software installed on school supplied laptops to secretly take more than 66,000 screenshots and photos of students, many of which were while the students were in their bedrooms!

For these reasons, progressive groups such as the American Civil Liberties Union (ACLU) and Electronic Frontier Foundation (EFF), with support from Google and Facebook and, surprisingly, members from both sides of the house, are campaigning for the act to be revised.

You can, and should, sign the EFF petition because, while upgrading the Electronic Communications Privacy Act of 1986 is nowhere near as exciting as cold fusion and the prospect of limitless energy, it still matters, and until Rossi's device is proven to work, the flaws in the ECPA are far more real. ■

Gibbs has signed the EFF petition from Ventura, Calif. Your thoughts on the act to backspin@gibbs.com.

NETBUZZ | BY PAUL MCNAMARA

Fun with naming Wi-Fi nets

ACCORDING TO a media report out of San Antonio, the man recently accused of planning to assassinate a Saudi diplomat in Washington, D.C., was not the sharpest tool in the box. However, if neighbor accounts are to be taken at face value, the same could be said of the FBI agents tasked with foiling his alleged plot.

It's unlikely, however, that those accounts are worth face value.

From that story: "Neighbors, however, said it had been years since [suspect Manssor] Arbabsiar lived in the stucco house he once shared with his wife on a suburban cul-de-sac. They said it appeared as many as 10 people were living in the house, and lately there had been some signs of suspicious activity: When residents looked for available Wi-Fi networks, names like 'FBI Van 1' would pop up."

The idea that the FBI would be so foolish as to choose "FBI Van 1" for a Wi-Fi SSID landed the story on the front page of Fark, a social-bookmarking site that specializes and delights in skewering the stupid.

But could the FBI really have been that stupid?

Presuming it would be futile to ask the FBI directly, I did a bit of online searching and quickly turned up ample reason to believe that the answer is, "No, not that stupid."

In fact, the question had also come up as recently as this summer after news reports about an alleged plot to blow up a Tampa, Fla., high school included assertions that the FBI had been busted using "FBI_SURVEILLANCE VAN" as an SSID.

No proof materialized, but the stories did elicit many accounts of people doing this sort of thing with their home Wi-Fi ... just for yuks. It's such a common gag, in fact — with so many variations — that "Police Surveillance Van 2" topped Mashable's list of favorite Wi-Fi names.

Case closed, right? Do not besmirch the FBI with this accusation any longer.

Well, hold on there a minute, J. Edgar, let's play devil's advocate (tongue-in-cheek style): If every wise guy on every block in America thinks it's funny to display "Surveillance Van" on their Wi-Fi — and if word of the joke has gotten around — wouldn't doing so offer the perfect cover for a real FBI surveillance van?

Think about that one as you're pulling back the curtain to take a peek out the window.

Kindle purchase offers 10-year-old a lesson

Recently my 10-year-old daughter, Emma, a voracious reader, took delivery of the family's first Kindle. She's barely put it down since.

One thing that made this purchase particularly notable in our household is that Emma paid for it herself using money from birthday gifts and the like. She forked over $89, which was not only more than she'd ever spent but also represented a significant portion of her personal wealth (at least that which she's allowed to access).

An e-reader and a rite of passage, all wrapped up into one. What's not to like?

Well, the very next day I received an email from Amazon with the subject line: "Kindle, now from $79."

It's only $10 difference, you say? ... Did I mention she's 10?

I'm still trying to decide whether to tell her or not. ■

Send your parenting advice and other comments to buzz@nww.com.

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